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WIRE DRAWING IN ENGLAND.

A Description of the Progress Made in the Methods of Manufacture of Wire During the Past Twenty-five Years.

By Drahtzieher.

THE CONTINUOUS PROCESS OF WIRE DRAWING.

Following on from the brief remarks contained in a previous article on the History of Wire Drawing,* the present deals with the methods which are and have been in use during the last twenty-five years. Some considerable progress has been made, and it is fair to suppose that the very keen competition in the manufacture of wire at the present time, will lead to a number of improvements in the future. The introduction of continuous wire drawing has been the greatest feature in the period above mentioned. This system, which is essentially several single wire blocks incorporated in a single machine, has been put forward in many designs, and was on its introduction, given a very hostile reception by wire drawers, for the same reasons which were put forward by the cotton operatives, when the first labor-saving machines were brought into practice. Wire drawing is a very carefully concealed art, which art, however, is essentially a mechanical feature, the skilled men of the old days being those who were able to work the more closely to mechanical principles.

Continuous wire drawing embraces these principles, and, consequently, unskilled labor only is employed, which is naturally, to the wire drawer, a step in the wrong direction. This opposition has been overcome in numerous mills, but is still one of sufficient importance to prevent manufacturers operating the machines satisfactorily; in fact, a number of continuous mills have been closed down, owing to the inability of owners to find the labor to work the machines. Continuous wire drawing is, at the present time, most successfully applied to the working of copper, brass, German silver, soft steel and iron, in which materials there is no difficulty, but as applied to hard steels there cannot yet be said to have accrued a large measure of success to the system, although there are a number of plants in operation about which little information is obtainable. Continuous wire drawing has brought into a more general use, precious stones as dies; diamonds are universally used and only in a small measure rubies.

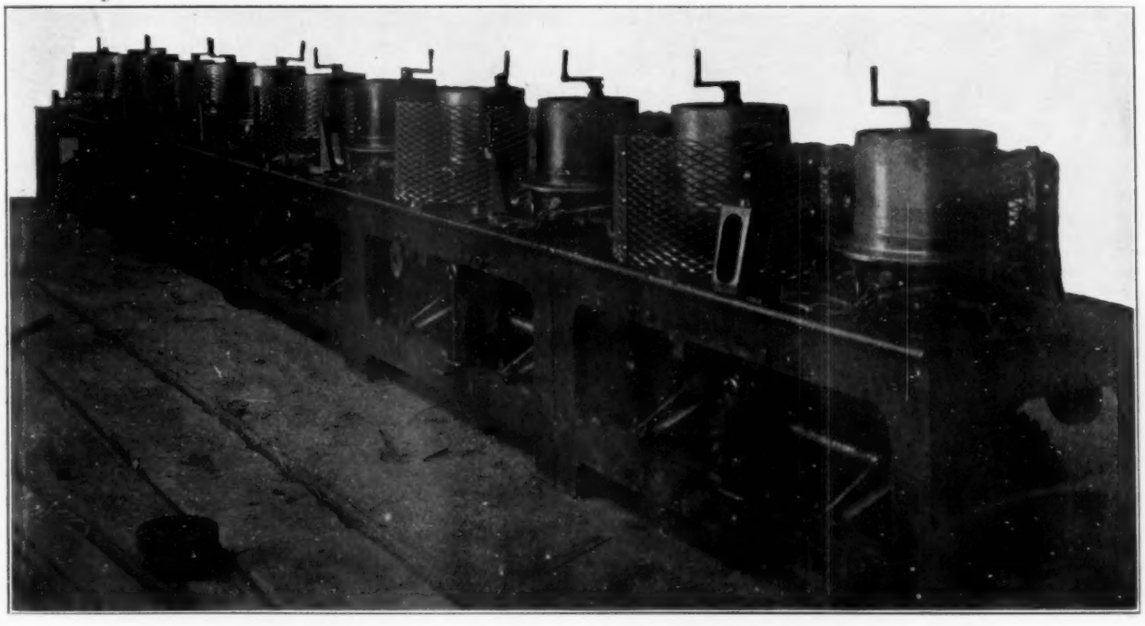

FIG. 1. ROW OF WIRE BLOCKS, GEAR DRIVEN, WITH FOOT PEDAL OPERATING CATCH.

ADVANTAGES OF THE PROCESS.

The advantages of continuous wire drawing are obvious, but perhaps may be summarized here:

*The Metal Industry, July, 1910.

(a) Cheapness in operation, by reason of the use of unskilled labor and in general one operator to attend four machines, which if averaging six reductions per machine, means one unskilled man to deal with twenty-four reductions, on four ma-

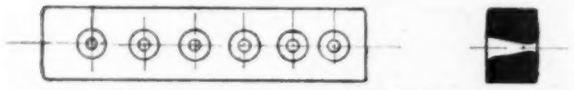

FIG. 2. PLAN OF STEEL DIE BLOCK.

chines, which can be put against four skilled men (presuming each looks after six blocks) dealing with twenty-four single block wire drawing machines.

(b) Small space occupied.

(c) Ability to deal with long coils and heavy weights and avoidance of handling.

This last clause has assumed a very important position in view of the many varied operations on automatic wire-forming machines, which form shapes from a coil or hank of wire; it is obvious that the longer the length of coil

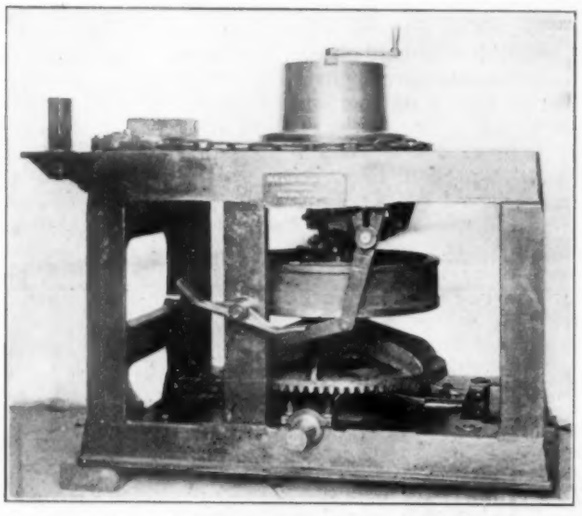

FIG. 3. SINGLE WIRE BLOCK MACHINE.

the fewer times the machine is required to be stopped to put on a new coil; and if the coil is long enough, an automatic machine might run for a whole day without stopping. There have been a number of difficulties to overcome in obtaining the long length of coils, although with copper, small difficulty only is found, but in many brass mixtures, it is not practicable, and resort has to be made to welding; this is done generally by electricity at a very low cost and the weld is perfect within 2 or 3%, that is in 100 welds, two or three only fail. This operation then enables practically any length of coil to be obtained. The use of continuous machines in such cases is very advantageous, as the machine is running continually for a long time without attention, and there is no handling.

DIES EMPLOYED FOR DRAWING.

A difficulty in drawing long lengths, represented by the wear of steel dies, has been overcome, by the use of precious stones as dies. Before the introduction of precious stones as dies, it was impossible to draw a long length of wire of the same exact diameter, owing to the wear of the steel die; a diamond die will keep its size for many weeks. The dimensions of dies is a matter of perhaps small importance, but it is one to which has been paid small attention, and it is very doubtful if there are two firms in this country using the same sizes. With regard to the shape of the hole this is no doubt of greater importance than is generally considered. By far the greatest power taken in drawing wire is absorbed in friction in the die itself. This can be easily proved, but it is beyond the scope of this article to enter into detailed calculations.

For the larger sizes of wire, oblong plates of steel, i. e., die plates, are used having a number of holes "pricked," i. e., punched at regular intervals along the center of the plate. This shape also applies for drawing the finer sizes

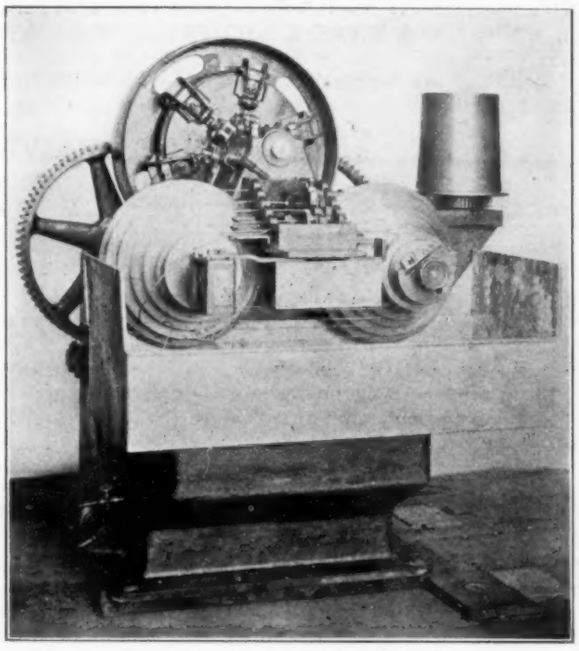

FIG. 4. A TYPE OF MULTIPLE DIE CONE MACHINE.

on single blocks; for continuous drawing, however, square or round dies are used having a single hole in the center; these dies are generally about 1 in. cube (Fig. 2); diamond dies and other precious stones are made in various carats, the hole being made by special drilling appliances, the stone is fixed generally in a gun-metal casing; the cost of such dies is considerable, running from between 20s. to £20, the great advantage of course is given by the long life of the hole, without varying in size.

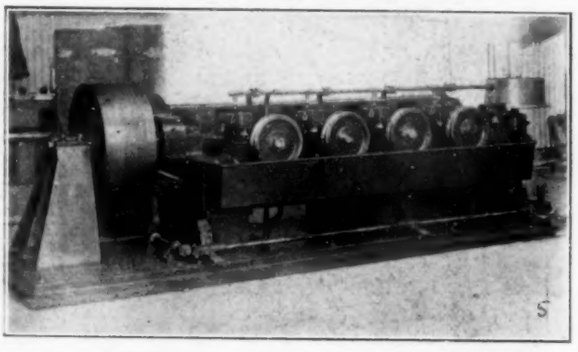

FIG. 5. ANOTHER TYPE OF MULTIPLE DIE CONE MACHINE.

The precise comparative advantages of diamond and ruby dies is a question of individual opinion, which varies considerably.

There is a practice in America to use chilled cast-iron dies, which, however, is not adopted over here; possibly for the reason that sufficient attention has not been given to their manufacture, but there can be a very slight dif-

ference in the cost of iron and steel dies in the long run, as, of course, a cast-iron die is scrap when it is worn, and a steel die can be hammered up. Steel dies are made of a hard malleable steel, which, after annealing, can be hammered up. The use of high carbon tool steels has not yet been successfully dealt with, but will no doubt become a feature later.

WIRE-DRAWING MACHINES.

The single wire block is familiar to all with a knowledge of wire drawing, and consists simply of a cylindrical block fixed on a vertical revolving shaft, such as is shown in Fig. 3, illustrating a heavy bench driven by bevel gearing and thrown in and out of gear by a friction clutch. Many variations are in use in the method of drawing; by friction clutch as shown; by foot-pedal operating catches on underside of block; by worm and worm gearing for heavy work, etc. The ordinary single bench is so simple that it is only a question of requirements and the ideas

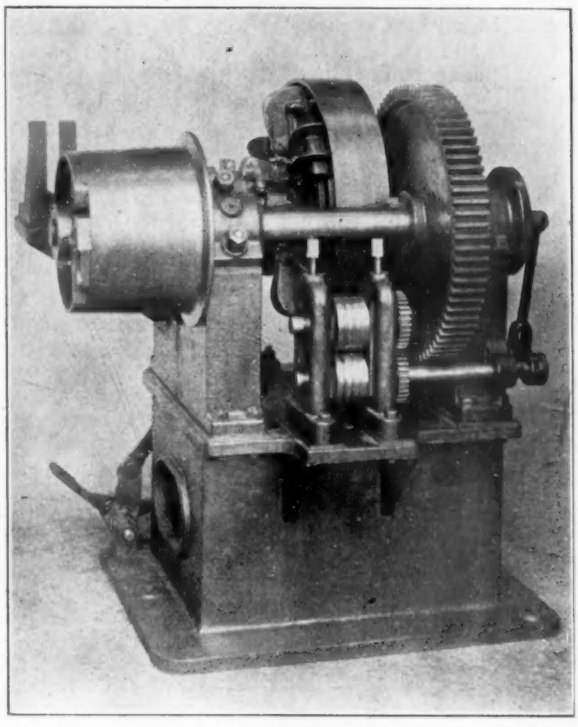

FIG. 6. STRINGING-UP MACHINE.

of the manufacturer, and unfortunately these ideas and conditions vary so much that it is a question if there are half a dozen benches alike, except in the Yorkshire and Lancashire districts, where they universally use one type; i. e., the gear driven with foot-pedal operating catch on underside of block; a row of blocks of such type is shown at Fig. 1.

Passing from the single block to the continuous type of machine, we find practically two methods, using multiples of dies: Those drawing through a number of dies in a straight line, and those known as Cone machines. Examples of these types are given in Figs. 4 and 5 respectively. The results from each machine are the same, but the straight-line type has the advantage of simplicity in its die arrangement, there being only one die to each box. The Cone type has the advantage of small space occupied and small number of parts.

The output from continuous machines is reduced considerably by the time taken in "stringing" up or threading the dies. This difficulty is done away with as much as possible by a stringing-up machine. Fig. 6, which threads the required number of dies whilst the wire-drawing machine is being operated, so that when one piece of wire is finished, a new piece can be immediately

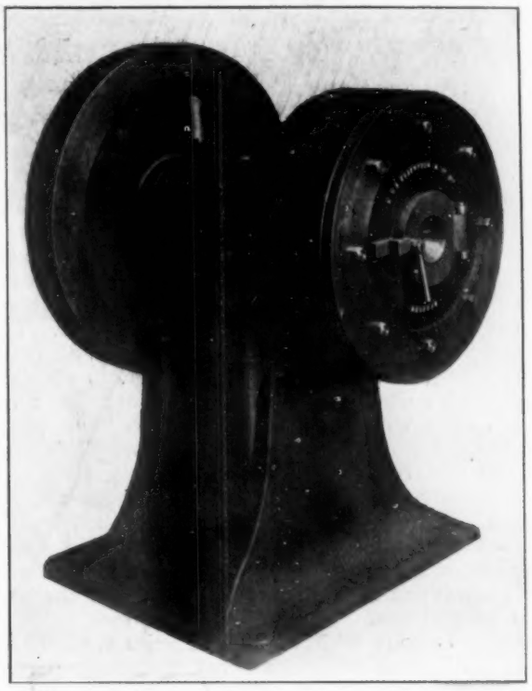

FIG. 7. POINTING MACHINE FOR HEAVY WIRE.

put on, doing away with the process of threading up the machine itself and thereby giving an almost continuous output.

Pointing machines, for pointing heavier wires, are of

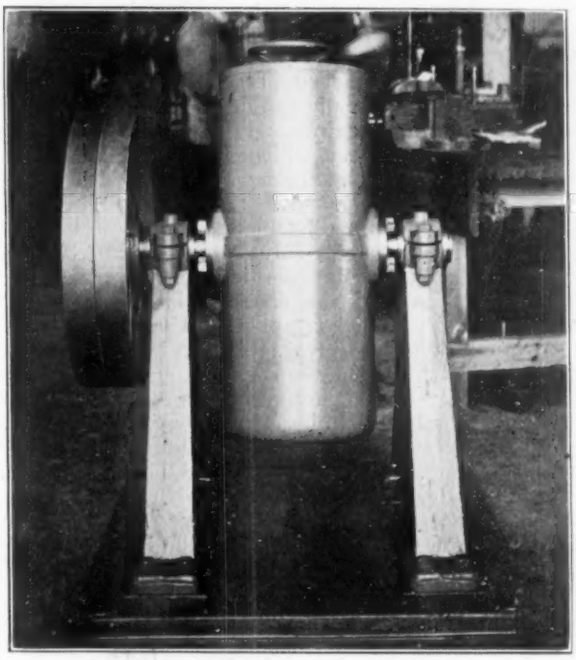

FIG. 8. REVOLVING BARREL CLEANING MACHINE.

interest, apart from their undoubted labor-saving qualities, in the fact that a wire can be pointed cold in from

two to five seconds and produce a sound and accurate result. Such a machine is illustrated in Fig. 7. The result is obtained by an arrangement of accurately-made rollers and hammers, giving a large number of closures per minute to a pair of dies of the required shape.

For non-ferrous wires, cleaning is done most economically by a revolving barrel shown in Fig. 8, which revolves at a suitable speed, and insures the water which is introduced into the barrel, dashing itself among the coils of wire; a barrel containing 15 to 20 cwts. of wire can be cleaned in about ten minutes, and one operator can deal with two machines, a large saving over hand beating.

THE MICROSCOPE AND THE BRASS FOUNDRY.

SOME OF THE ADVANTAGES TO BE DERIVED FROM ITS USE IN MANUFACTURING BRASS AND BRONZE.

BY CHARLES T. BRAGG.*

(Concluded from January.)

PREPARATION OF SAMPLES FOR INSPECTION.

Next in importance to having a good instrument is the preparation of specimens. Specimens for the metallographical microscope must be polished in such a way that defects of the polishing do not appear as characteristics of the specimen. This means, of course, that the specimens must be perfectly polished. There are several methods of polishing specimens, all equally good. The general scheme is, however, to polish the sample with rough emery, so that the scratches all run parallel, after which, at right angles to these parallel lines, the specimen is further polished with fine emery until the first rough lines are obliterated, after which it is generally polished with tripoli at right angles to the scratches made with the fine emery and until the scratches are removed, and finally it is usually polished with jeweler's rouge. There are considerable variations of practice in polishing samples, but the above are in general use.

Etching is done with various chemicals, nitric acid, solutions of picric acid in alcohol, hydrogen peroxide and ammonia as well as many other re-agents are used, depending, of course, on just what constituents are expected to be brought out, and very often several etchings with different re-agents will be necessary in order to exhaust the possibilities of any one sample. There are other methods of bringing out foreign matters and constituents other than etching, chief of these being the so-called heat tinting. Phosphor bronze is a good example of a non-ferrous alloy, which can be very successfully heat tinted as shown by law. In this particular case the copper constituent assumes a brilliant red and the phosphide of copper a yellow, the solid solution remaining gray. Professor Burgess and James Aston of the University of Wisconsin have been very successful on the pure brasses with the use of hydrogen peroxide and ammonia. While Mr. Clamer of Philadelphia has successfuly etched samples of plastic alloy electrolytically. It can be seen, therefore, that there is considerable room for ingenuity on the part of the operator in the etching of specimens. Photomicrographs to the more experienced operator are of invaluable service, as they can be more easily studied than simple specimens under the high power lens. Photomicrographs, however, involve considerable technique and possibly would not as much interest a beginner as a more experienced metallographist, and possibly would not interest the average foundryman at all.

It will be noted that in many instances when polishing material such as canvas is used, that the harder particles of an alloy will be discernible under the low power without any etching whatever. Law gives as a general proposition that the average examination of an alloy should be made in three stages and it will be found that this recommendation is generally applicable. First, polish the specimen as recommended in the earlier part of this article and examine under both low and high powers, say 100 and 500 diameters. This will reveal the relative hardness of the various constituents, the hard constituents being polished a little brighter, will reflect light and be easily discernible. For example, in a bearing metal consisting of a hard matrix in which are occluded particles of lead, there will be no difficulty in distinguishing the net work of hard bronze in which the lead is occluded without etching at all. Further than that, blow holes and cracks, in the case of iron, are distinguishable. Experienced operators can often detect the uncombined elements of the alloy. In this connection it may be mentioned that an analysis made by drilling through a specimen indicates only the ratio of the elements and does not indicate whether the elements are combined or uncombined. However, an analysis and a microscopical examination together will not only give the ratio of the constituents, but indicate in just what proportion they may have combined.

After this examination, the sample may be etched lightly by a method given earlier in this article and re-examined. This will intensify many of the characteristics already found and bring to light such flaws or evidences of mechanical defects as the unetched did not show. Then the specimen can be more deeply etched, at which point a high power, say 1,000 diameters, will resolve the alloy into its basic constituents. Regarding the etching, it may be said that it is always easier to etch a little more, than it is to take a specimen after it has been etched too much, re-polish and re-etch, which is just what has to be done when the etching is overdone.

It is well also to note that the tendency among those not familiar with metallographical work, is to use higher powers than is necessary. In fact, most of the work on brass and bronze can be done below 500 diameters, inas-much as the average person examining for practical purposes is not likely to care much whether the alloy has been resolved into its basic constituents or not. The prime object is to find whether or not the alloy is uniform and homogeneous, and whether it contains slags and other flaws.

Le Chatelier (according to law) recommends the use of a solution of soluble gun cotton in amyl acetate, but the writer has found that a solution of the same in alcohol ether to be an excellent preservative for a polished specimen. A thin coating of this can be brushed on to the surface of the specimen, when the ether evaporates and leaves a very thin film of collodion, which not only protects the specimen, but does not interfere with its future examination. Professor Burgess and Mr. Aston of University of Wisconsin, recommend the use of a Nernst lamp as the best means of external lighting. However, a Welsbach gas light can be used and is probably the next best light to the Nernst lamp. Several mechanical devices are on the market, by which specimens can be mounted on glass slides, so that the polished surface is absolutely parallel with the surface of the slide, which, by the way, is essential.

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PATENT CONTROVERSY OVER BEARING METALS

THE CONTINUATION OF AN INTERESTING DISCUSSION WHICH WAS STARTED BY THE READING OF A PAPER AT THE CINCINNATI CONVENTION OF THE BRASS FOUNDERS' ASSOCIATION, MAY, 1909. NINTH PAPER.

BY ANDREW ALLAN, JR.*

I was very much surprised on looking over the March issue of THE METAL INDUSTRY to see Mr. Clamer's reply to my paper published eight months prior, in the July, 1910, issue. This discussion of the metallurgy of lead-copper alloys, without and with tin, has extended over a period of almost two years. I will not at this time comment on the experimental bearings submitted by Mr. Clamer, nor reply to his paper in detail.

I still maintain that the art of alloying lead and copper with and without tin was invented by Andrew Allan, Sr., in 1876, and that the results obtainable by this art have not been accomplished by any other metallurgist. My personal experience has extended over a period of eighteen years, devoted exclusively to the manufacture of lead-copper alloys without and with tin, and I can conscientiously state that I cannot produce merchantable castings of lead-copper and lead-copper-tin by ordinary foundry practice, nor have I seen such castings containing over 25 per cent. of lead produced by others. In my opinion, any foundryman has a legal right to produce lead-copper alloys without and with tin, in any proportion, without or with the use of sulphur.

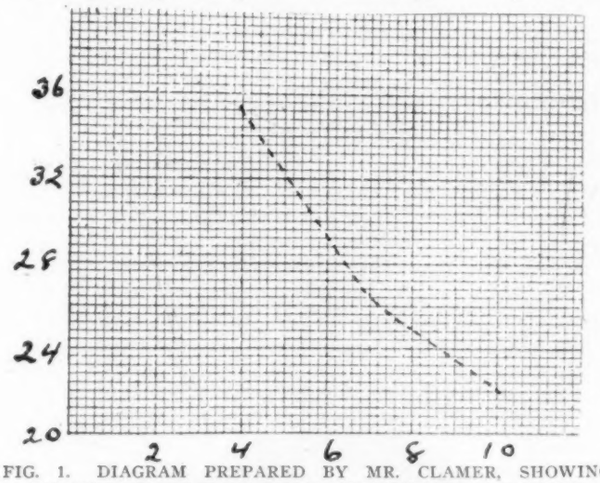


FIG. 1. DIAGRAM PREPARED BY MR. CLAMER, SHOWING AMOUNT OF TIN THAT CAN BE PRESENT WITH VARIOUS PERCENTAGES OF LEAD WITHOUT CAUSING LEAD SWEAT.

Mr. Clamer has prepared a diagram showing the amount of tin that he claims can be present with various percentages of lead without causing lead sweat, which is herewith reproduced. (Fig. 1.) This diagram conflicts with Mr. Clamer's claim made in a paper presented at the Franklin Institute in 1903, in which he stated that he could not produce castings with slightly over 20 per cent. of lead when 7 per cent. of tin was exceeded. By his diagram he now tells us that he can produce alloys containing 22 per cent. of lead with 10 per cent. of tin, and alloys with 24 per cent. of lead with 9 per cent. of tin. In the August, 1909, issue of THE METAL INDUSTRY, Mr. Clamer states:

> The difficulty which we overcame was not alloying lead and copper alone, but alloying lead and copper in the presence of tin.

Does ordinary foundry practice overcome this difficulty? If so, then the difficulty never existed to be overcome. Mr. Clamer concedes that the Allan Process does control the lead in lead-copper-tin alloys where the tin is in excess of 9 per cent. to 91 per cent. of copper in the mix. This being true, the Allan Process controls the lead where the tin is less than 9 per cent. to 91 per cent. of copper in the mix.

Mr. Clamer acknowledges by his diagram (Fig. 1) that he cannot produce alloys which he endeavors to control by his patent claim, i e., lead-copper-tin alloys, where the tin is less than 7 per cent. by weight, lead more than 20 per cent. and the balance, or 73 per cent., copper. Take the alloy 59½ per cent. copper, 35 per cent, lead, 5½ per cent. tin and the alloy 55 per cent. copper, 40 per cent. lead, 5 per cent. tin, both of which are within Mr. Clamer's patent claim, as shown by my diagram, Fig. 2; yet he admits that he cannot produce these alloys. I should think Mr. Clamer would be very willing to produce evidence in support of his patent claims: Prove that by ordinary foundry practice lead-copper can be alloyed in any proportion where the tin is less than 9 per cent. to 91 per cent. of copper in the mix.

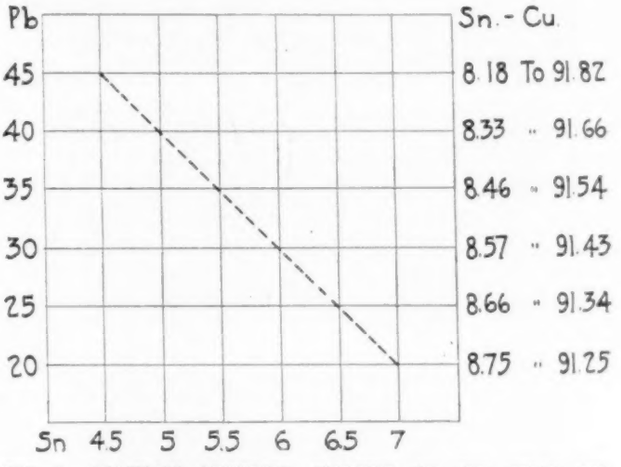


FIG. 2. DIAGRAM SHOWING AMOUNT OF TIN THAT MR. CLAMER SHOULD BE ABLE TO ALLOY WITH VARIOUS PERCENTAGES OF LEAD WITHOUT SHOWING LEAD SWEAT, ACCORDING TO HIS PATENT CLAIMS.

I would therefore suggest that Mr. Clamer send to THE METAL INDUSTRY office 100 pounds of an alloy of 55 per cent. copper, 40 per cent. lead, 5 per cent. tin, made by ordinary foundry practice, THE METAL INDUSTRY to have it analyzed, and if found to be of the proportions called for and strictly lead-copper-tin, to have said alloy recast into merchantable castings under their supervision. If these castings show no lead sweat or segregation I will gladly concede that Mr. Clamer can accomplish by ordinary foundry practice the alloying of lead and copper in any proportion where the tin is less than 9 per cent. to 91 per cent. of copper in the mix. If his claims are substantiated I will willingly assume all costs incurred by this test. Mr. Clamer will appreciate the great opportunity open to him by meeting my suggestion, to prove that he erred in his diagram, that his patent claims are true beyond all dispute. Why not do this at once?

*Of A. Allan & Son, New York.

MODERN ABRASIVES*

By George N. Jeppson.

The grinding wheel and the special machine for its use have reached a state of development where they are receiving appreciative attention in the mechanical world. The worker in metals recognizes that these tools have their useful field and the production engineer, in considering the proper method to be used in developing a finished machine part, must consider the grinder, would he compete with his progressive brother.

No industry has served more to bring before the world the utility of these tools than the one you represent, and I believe you will agree that the production of the automobile of today, with its ball and roller bearings, special alloy steels, and precision in all its essential rotating parts, would have been practically impossible without the grinding wheel and the machines on which it is used.

It was comparatively easy for the mechanical world to accept the artificial wheel of emery and corundum to take the place of the file on castings, and later to displace the grindstone in the sharpening of tools, and at about the same time, the earlier forms of surface and cylindrical grinding of hardened steel machine parts, for the obvious reason that the grinding wheel here had a clear field, and there were no recognized prejudices or habits to overcome. But as soon as we entered the field occupied by the lathe builder and the lathe hand, we had a campaign of education on our hands, which has, in the end, met with success.

The metallurgist has also in recent years created new fields for grinding, by the many new combinations of the elements with iron, giving us alloys which are difficult to machine in the old way. Those of manganese and iron can be machined only by grinding.

ABRASIVES IN USE TODAY.

My contribution today will be on the grinding wheel. The essential parts of its structure are the bond and the abrasive. The abrasive, which forms the cutting teeth of the wheel, is graded into grain of standard sizes and the grain to be used is selected according to the duty it is to perform, and not only the size of grain must be considered, but also the temper or toughness, as well as the hardness. No abrasive in use today is the best on all materials. They each have their field, some because of their natural physical properties, and others because their composition allows them to be bonded better than others for certain classes of grinding.

In the following microphotographs, I will show the abrasives in use today and comment on them in detail.

*A paper read at the annual meeting of The Society of Automobile Engineers at New York City, January 11 and 12, 1911.

This abrasive is being rapidly replaced by the more efficient artificial abrasives. It has, however, still a use in those wheels used for certain grinding processes such as for steel balls. Wheels for this purpose must be bonded very hard, and the roughness of the surface of the grain and the high percentage of impurity allow this to be done with wheels made of emery. As an abrasive for general grinding purposes, it is not as efficient as the modern electric furnace product.

NAXOS EMERY ANALYSIS.

Aluminum Oxide	67.13
Ferric Oxide	15.54
Silica	2.72
Titanium Oxide	3.75
Calcium Oxide	.43
Magnetic Iron	8.43
Loss	2.73

CORUNDUM.

This is a natural abrasive. Its quantity is limited and its quality lacks uniformity. Where the quality is good, it is an efficient abrasive on soft and heat treated steels.

CORUNDUM ANALYSIS.

Aluminum Oxide	91.05
Ferric Oxide	3.45
Silica	3.00
Titanium Oxide	.25
Calcium Oxide	.82
Loss	1.24

ALUNDUM.

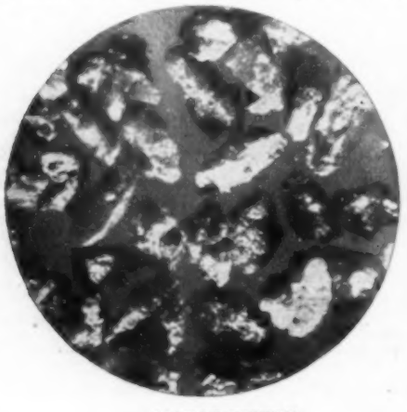
This abrasive is made in the electric furnace, is produced from bauxite, a hydrate of alumina. Bauxite is purified in the electric furnace so that the product is high in crystalline aluminum oxide, and it is probably the most efficient abrasive known on steel. Its quality is under control and the quantity is unlimited. This naturally stands for duplication in wheels so far as this is practical and possible.

REGULAR ALUNDUM ANALYSIS.

Aluminum Oxide	91.25
Ferric Oxide	2.50
Silica	1.75
Titanium Oxide	4.35
Calcium Oxide	.25
Magnetic Iron	1.25

SPECIAL ALUNDUM.

The greatest advance in recent years in the making of artificial abrasives is the art of being able to fix the

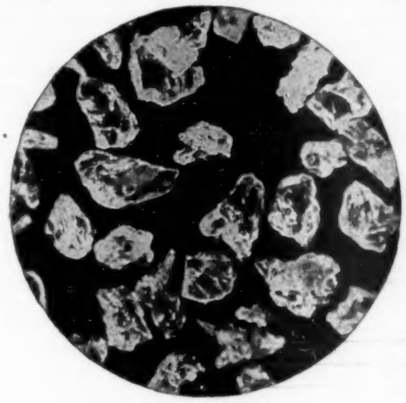


NAXOS EMERY.

CORUNDUM.

REGULAR ALUNDUM.

toughness or what we call the "temper" of an abrasive. Very hard metals, like hardened tool steels, require for their efficient grinding an abrasive which is hard enough to penetrate the surface ground and tough enough to remove its chip without breaking off or dulling too quickly. If it breaks immediately, we are grinding on a lap without cutting points. The professional grinder says "grinding on the bond." If it is so tough that the



SPECIAL ALUNDUM.

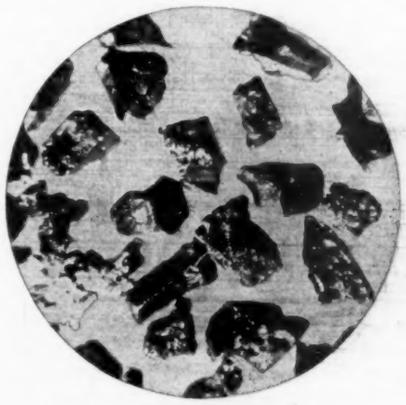
cutting points, just dull, you have increased the area of each tooth to such an extent that the friction in making the cut is so increased that we have heat and at the same time our depth of cut possible is decreased and we have an efficient wheel. The material shown in Fig. 4 is the most efficient material known for the grinding of all classes of special hard and tough steel.

SPECIAL ALUNDUM ANALYSIS.

Aluminum Oxide	99.17
Ferric Oxide	.65
Magnetic Iron	.15
Silica	.16

CARBIDE OF SILICON.

Carbide of Silicon, otherwise known as Carborundum in this country, and in Europe under various other names, is an artificial abrasive made in the electric furnace from coke and sand, and is the hardest abrasive in use. It is the most efficient we have on



CARBIDE OF SILICON.

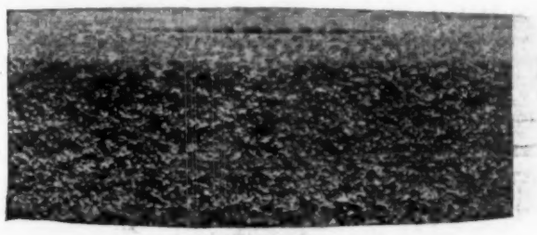
cast iron, chilled iron and brass. In most cases it gives the desired finished surface, but where a high finish is desired the carbide of silicon wheel is used first in the roughing operation and the finish is put on with a wheel of an aluminous abrasive. In cylindrical grinding with wheels of carbide of silicon the main objection is in the wear of diamonds used in truing the wheel. I have a record of an Aluminum and Carborundum wheel where 25 cuts of 1-1000 each were taken with the same diamond on both wheels. Careful weighings showed that the ratio of wear was Alundum 1 to Carborundum 4½.

CARBIDE OF SILICON ANALYSIS.

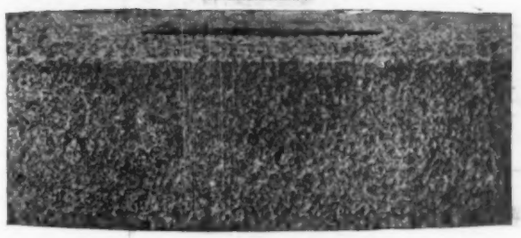
Silicon	67.50
Combined Carbon	28.57
Aluminum Oxide	.85
Ferric Oxide	2.06
Silica	1.08
Titanium Oxide	.13
Free Carbon	.44

The balance of this paper by Mr. Jeppson will be published in the next issue of "Grits and Grinds." It takes up the subject of bonds in modern grinding wheels and some experimental tests using wheels made of the different abrasive materials.

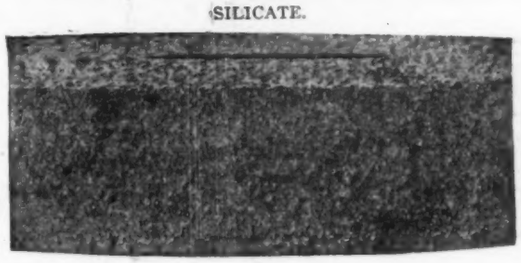
The function of the bond is not only to hold the cutting particles of the wheel together and to give the



VITRIFIED.



SILICATE.



ELASTIC.

wheel the proper factor of safety at the speed it is to be run, but it must also be possible to vary its tensile strength to fit the work it is called upon to do. We often hear the operator say that the wheel is too hard or too soft. He means that the bond retains the cutting teeth so long that they become dulled, and this wheel is inefficient; or, in the case of a soft wheel, the bond has not been strong enough to hold the cutting teeth and they are pulled out of the wheel before they have done the work expected.

The bond to be used for a given operation depends on the wheel and work speeds, area of wheel in contact with the work, vibration in wheel spindle or work, shape and weight of work, and many other like variables.

Wheels are bonded by what are known as the vitrified, silicate, elastic and rubber processes. Were I to enter into a detailed description of these bonds it would require considerable time, and I will therefore only speak briefly on the essential features of each.

No one bond makes a superior wheel for all purposes; each one has its field.

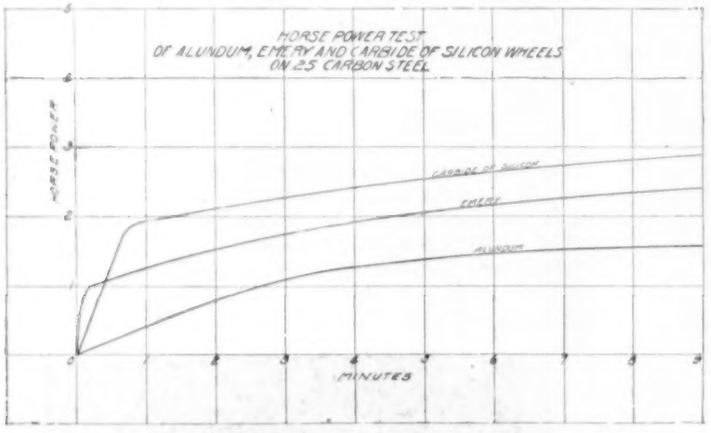


FIG. 1.

VITRIFIED BOND.

This bond is made of fused clays, is unchanged by heat or cold, and can be made in a greater range of hardness than any other bond. It does not completely fill the voids between the grains, and therefore, a wheel bonded in this way having more clearance than any other is adaptable for all kinds of grinding except where the wheel is not thick enough to withstand side pressure. This bond has no elasticity.

SILICATE BOND.

This bond is composed of clays fluxed by silicate of soda at low temperatures. It is not as stable as the vitrified bond as regards dampness, gives less clearance between grains, and has a range of hardness below that of the vitrified in the harder grates. This bond has no elasticity and will not make a safe wheel of extreme thinness.

ELASTIC BOND.

This bond is composed of shellac and other gums. It completely fills the voids of the wheel, has a limited range of grades, has a high tensile strength and elasticity, and can be used for the making of very thin wheels. The rubber or vulcanite bond has the general characteristics of the elastic, but its grades of hardness cannot be varied to the same extent and its uses are limited.

PROPER COMBINED ABRASIVE AND BOND.

From what I have said about abrasives and bonds you have probably come to the conclusion that given a certain grinding operation, you must, in order to have the most efficient wheel, have a combination of right abrasive and proper bond. In order to show conclusively that the abrasive of which crystalline aluminum oxide is the cutting property, such as emery, corundum and Alundum, is superior to carbide of silicon on metals of high tensile strength, such as alloy steels, high and low carbon steel and wrought iron, and also to show that carbide of silicon is superior on metals of low tensile strength, such as cast and chilled iron, the following tests have been made:

TESTING APPARATUS.

The apparatus used was a motor-driven Norton Cylindrical Grinding Machine, of the 14 x 72 size, recording revolutions per minute of the work and wheel spindle, the electrical energy used being registered on a Westinghouse graphic ammeter The efficiency of the abrasive wheel we considered to be measured by the horse-power required to do a given operation. All conditions of the tests were constant, except the abrasive wheel. The test piece was of 25-point machinery steel, 2 inches in diameter and 24 inches long. The abrasive wheels were the best we had available for the purpose.

The following curves were developed from these tests:

CURVE SHEET NO. 1.

An analysis of the curves shows that Alundum is the most efficient abrasive for this work. It is easy to explain the efficiency of Alundum as compared to emery. Both abrasives are of the same nature chemically, the only difference being that Alundum is of greater purity. It is known that the higher the percentage of crystalline aluminum oxide the more efficient is this type of abrasive. Why carbide of silicon, which is harder than emery, corundum or Alundum, should be less efficient on steel than even emery is not so easy for the layman to understand. The reason is that carbide of silicon lacks the property of toughness. By test, as compared to Alundum, it is in the ratio of 1 to 4. This means that in the grinding of steel, a metal one of whose properties is high tensile strength, the cutting tooth is broken off close to the bond and we are then grinding on a cutting surface composed to a large extent of bond. The wheel, having neither cutting teeth nor clearance glaze, quickly glazes. Some who have used this material on high carbon steel and got a highly burnished, bluish surface at high expense may correctly assume that they were grinding on a lap consisting of silicon carbide and porcelain bond.

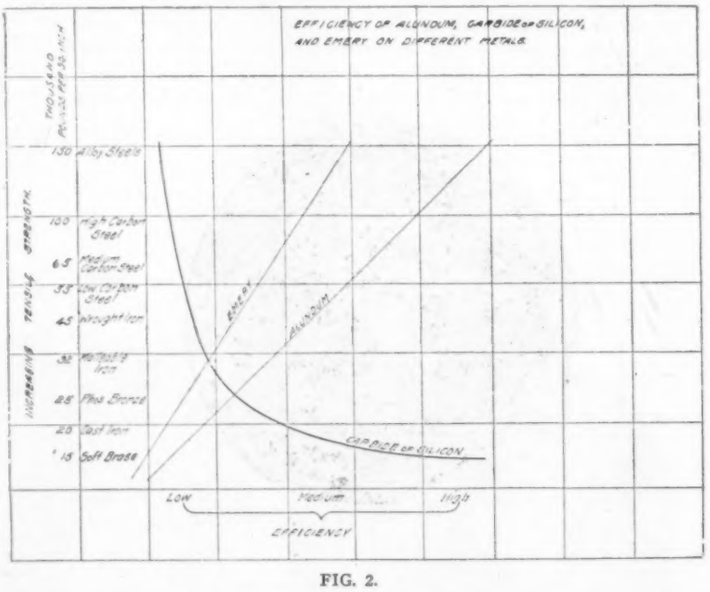


FIG. 2.

Before we leave this curve I would call your attention to the rapid rise in horse-power in the carbide of silicon and emery wheel. In the carbide of silicon this is due to the fact that the brittle tops of the cutting teeth are immediately wiped off, leaving the duller wheel, with consequently greater consumption of horse-power. The emery wheel, being composed of a softer material, also loses its cutting teeth, but being tough, not to the extent that you get down to the bond as quickly as in the case of the carbide of silicon wheel. The Alundum wheel shows a more consistent curve, this material having the properties of toughness and hardness so combined as to make it of the highest efficiency on metals of this class.

CURVE SHEET NO. 2.

This chart shows the relative efficiency of the abrasives in question, and may be of assistance in determining the kind of abrasives to be used.

In conclusion, I believe that with the general interest which is now being shown in the grinding wheel and machine, and the fact that the wheel is becoming recognized as a cutting tool rather than a grindstone, rapid advances will be made in the near future in the art of grinding.

TURNING BALLS AND RADIALS WITH AN ORDINARY COMPOUND REST.

By W. R. Swift.

The following article will be found to give some very useful information to metal patternmakers, wood patternmakers, machinists, etc. Figure No. 1 represents the centers of a lathe and an ordinary compound rest, which the writer has used for many years in turning balls and radials. For instance, if you wish to turn an acorn, ball or oval, or a piece similar to that shown on the face plate of Fig. No. 1. All that it is necessary to do is to move the swivel point "D" of the compound rest to the center of the lathe, loosen the screw of the compound rest and you are then able to swivel the rest, thus forming a ball turning chuck.

Anyone who is familiar with a lathe can readily see that this method can also be used to great advantage in turning balls or radials on work of any description, either between the centers of the lathe or in the chuck. As for example, if you wish to turn a bead—letter "E," having a 2-in. radius on a 5-in. diameter shaft, as shown

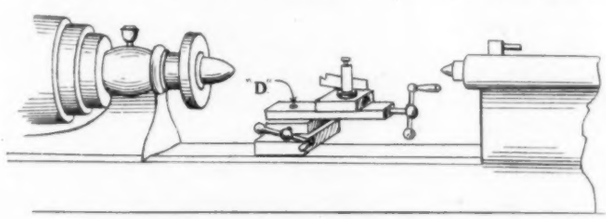


FIG. 1. TURNING AN "ACORN" BALL WITH ORDINARY REST.

in Figure No. 2, you can readily see that by moving the swivel point "D" 2½ ins. from the center of the lathe, which you will note brings it to the outer edge of shaft, then by traversing your tool 2 ins. from that point and loosening the screws you'll be able to swivel your rest and by doing so you make a 2-in. radius on the outside diameter of the 5-in. shaft.

Therefore, it follows, to turn beads of any radius on shafting or work of that nature, all that is necessary is to move swivel point "D" of compound rest to the outer edge of shaft, traverse your tool to the given radius, loosen the screws and swivel the rest and you are then able to obtain the results desired. It has been shown that by moving swivel point "D" of compound rest to the

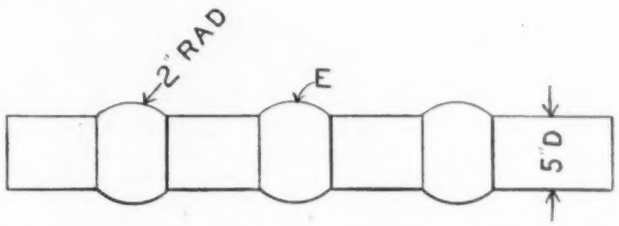


FIG. 2. A BEAD WITH A 2-IN. RADIUS ON A 5-IN. DIAMETER SHAFT.

outer edge of shaft and setting tool at given radius we are able to turn a convex. Now in order to turn a concave, either on face plate, in chuck or between centers of lathe, all that is necessary is to advance your tool in front of swiven point instead of in back.

SPARK-EMITTING ALLOYS.

By Robert Grimshaw.

The tax on matches in Germany, France and some other countries, has been the means of bringing to the front many new methods of obtaining a light; among them, devices, the action of which is based on the fact that by friction they emit sparks. Instead of the old-fashioned flint and steel (which, however, is also again used) there is employed a "pyrophore," consisting of a cerium alloy, which on being rubbed but slightly, emits sparks, and will ignite a wick that is empregnated with benzin. In one form, on touching a spring, the cover flies open, a piece of the alloy contained in this cover is thereby rubbed against a piece of steel attached to the case, and the sparks ignite the wick.

A suitable alloy for this purpose was discovered by Auer von Welsbach some years ago; it consists of cerium with about 30 per cent. of iron. The former metal is obtained by fusing and electrolysis. Pure cerium is too soft to give sparks which could be of use, and also is not very durable in the air, but this cerium-iron alloy does not oxidize easily, is harder, and may be filed, turned and planed. In order to prevent it from burning while being worked, the metal must be kept moist with petroleum and the turnings rendered harmless by falling in petroleum or water.

Instead of this cerium-iron alloy, Kühnheim has brought out one of cerium and about 12 per cent. of magnesium. This gives good sparks, but is not very resistant to atmospheric influences. Silicium, baron and titanium form also cerium alloys of the same general character. The reason for this property is not yet clear. Hillebrand and Norton assumed as far back as 1875 that the ignition point of cerium must lie very low, in order that the small amount of heat generated by friction would ignite it. The smaller the particles rubbed off, the higher the temperature attained by them; for this reason the alloy should be quite hard.

Auer suggests as the cause of the ignition low oxides of the metal, which form on the surface a pyrophorous layer; the formation of which is favored by the presence of the iron. The Auer metal is made in both Austria and Germany, in blocks weighing from two to three kg. (4.4 to 6.6 lbs. av.); also in strips about twelve mm. wide and two to three mm. thick. It is sold for about marks 250 a kilogram (say $27 a lb. av.), costs, however, only marks 40 to manufacture.

PLATERS' WRINKLES

SOME HELPFUL HINTS FOR PLATERS, SUPPLEMENTAL TO THOSE PUBLISHED DURING 1909 AND 1910.

BY CHARLES H. PROCTOR.

NICKEL SOLUTIONS.

The difference in temperature between summer and winter has a very decided effect upon nickel solutions. A bath may work very well all through the summer and fall, but as cold weather approaches the work does not come from the bath satisfactorily, oftentimes dark or grayish, and in some cases peeling results. This is due to the solution becoming more concentrated on account of the lower temperature. The solution oftentimes deposits crystals on the anodes or tanks.

If you have live or exhaust steam this trouble can be very easily overcome in the following manner: Procure a lead pipe with not less than a half-inch aperture, connect this with your regular steam pipes with valve connections. Have the pipe sufficiently long so that it can be immersed in the bottom of the tank and come up on the opposite side and then on the outside of the tank so that the condensed steam can run into a pail or other receptacle. Have a valve connection on the outlet also, so that the steam can be controlled. In very cold weather if the steam is allowed to pass through the pipe for fifteen minutes the temperature of the solution will be raised to the normal (70 degrees), thus overcoming the difficulties noted.

In plating novelty work a small addition of gelatine or transparent white glue will give an exceedingly bright lustre to the nickel deposit, providing the deposit is not too heavy.

A good method to pursue in using up parts of old nickel anodes is as follows: Procure an iron rod of not less than one-quarter inch diameter, bend one end in the form of a hook, at the other end cut a thread so that a washer and nut can be used, drill holes in the pieces of anodes, and then place them on the iron rod. When sufficient has been placed upon the rod, put the washer and nut in place; coat them and also the part of the rod exposed to the action of the solution with a little asphaltum varnish, which will prevent corrosion. This method does not expose much surface, but it is a good way to use up old pieces of anodes that would have to be sold for less than half price.

Brass articles when immersed in a hot solution, consisting of one-half ounce of golden sulphuret of antimony and four ounces of caustic soda in each gallon of water, become oxidized with a pleasing brown shade. This will become darker if immersed in a dilute solution of sulphate of copper, used cold about four to eight ounces to the gallon. Several immersions in the same manner give deeper brown tones; when relieved give very pleasing effects upon brass.

UNSOLVED PROBLEMS IN ELECTROPLATING.*

BY GEORGE B. HOGABOOM.

. . . The automobile industry has brought about, more than anything else, the need of a heavy deposit of brass. At present this is done in a solution of cyanide of copper. The deposit is not only slow, but unsatisfactory, because of what is known as "spotting out"—a discoloration in spots which appears on the work after it has been polished and lacquered. Deposits on cast metal give the most trouble. It is probably caused by the acids or alkaline solutions being absorbed in the pores of the metal, or in the small blowholes, and the deposit covering these holes partially, leaving minute holes through which the solution oozes out. Several remedies have been suggested and tried, such as boiling out in some neutralizing chemical solution, placing in a drying oven for several days, but a satisfactory remedy has not been found.

An acid brass solution would be a great advantage. There is an acid copper and an acid zinc solution, but no acid brass electrolyte. The difference between the deposit from a cyanide and a sulphate of copper solution well illustrates the advantage of having an acid brass solution.

Tin.—The formula for a tin solution published by Roseleur is the most generally used to-day, as little, if any, improvement has been made upon it, although a good solution which would give a heavy deposit is much desired. In Roseleur's solution the electrolyte is not replenished by the anode, but by the constant addition of a concentrated solution. This should be overcome, and would be appreciated by manufacturers of tinware.

Aluminum.—While several solutions have appeared from time to time for plating upon this metal none of them are in general use, and for a good electrolyte that would deposit gold, silver, brass or copper so that it would stand burnishing and not peel off in time could be used.

Nickel.—The successful removal of a deposit of nickel from another metal without affecting the latter has not been accomplished.

An electrolyte that will remove fire-scale from brass; also one that will produce a bright or a matte surface in place of using the present acid dips.

An electric cleaner that will saponify the grease and take it into solution instead of driving it to the top, where it has to be constantly removed to prevent it adhering again to the work as the latter is removed from the solution.

A heavy deposit of lead on the inside of iron pipes, to prevent rapid corrosion.

A method to coat electrogalvanized iron or steel with decorative metals without destroying the rust-resisting properties of the zinc.

An alkaline nickel-silver solution that can be worked with a low voltage.

A method of etching steel without destroying a resistance film of gelatine.

Some alkaline substance that would replace cyanide of potassium. This would be universally welcomed.

For the above suggestions the writer is indebted to 100 different platers, who were kind enough to answer a request for unsolved problems. It may be interesting to note that 80 per cent. of them requested an acid brass solution.

*Abstract of a paper read at the Nineteenth General Meeting of the American Electrochemical Society, in New York City, April 6-8, 1911.

PRACTICAL SUGGESTIONS IN WIRING OF AND DISPOSITION OF WORK—PLATING OPERATIONS.

By G. W. Gilchrist.*

Considering the numerous volumes that are continually being published for the enlightenment of electroplaters, enabling them to produce more satisfactory work, economize in its manipulation and obtain the minimum of cost, little if anything has been written regarding many minor details, so far as I am cognizant of the fact. Would not an interchange of ideas on the various methods of preparing articles for plating be more beneficial to the majority of platers than many subjects that have been given far greater publicity? Among these, and one which seems to me of paramount interest, is the most practical way of wiring or racking work, which, if my experience is any criterion, varies greatly on the same class of work in almost every plating plant. Another subject bearing indirectly on this is the most efficacious manner of loading a tank to obtain the maximum capacity most expeditiously and with the least expenditure of energy.

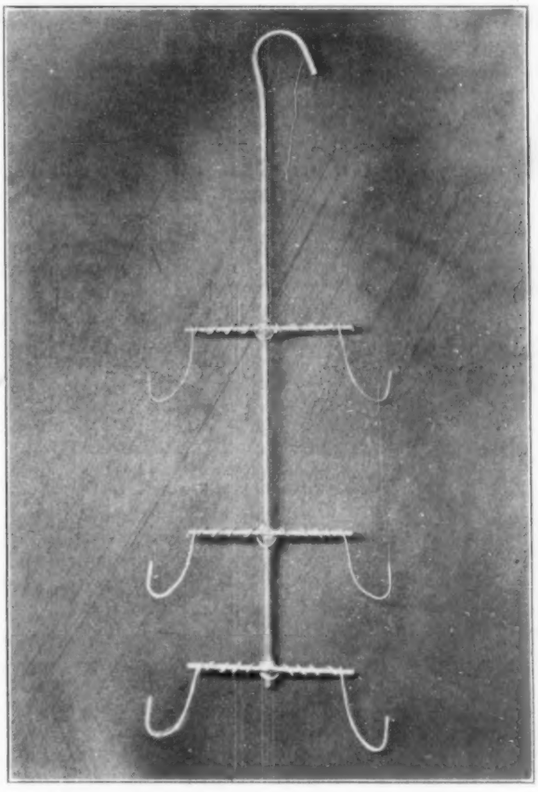
This subject has been deemed worthy of consideration by but one authority whose works I have read, and at the risk of being considered egotistical, I intend to show in this article what I consider a better plan than that advocated by him. Trusting that some iconoclast will use the "big stick" on my method and propose a better solution for these questions, I will first discuss the best way of wiring or racking up small articles for cleaning and plating. It was but a few years ago, when racks were seldom seen in shops doing anything but a few regular lines of work, and there are still many among us who consider a wire preferable to a rack, notwithstanding the expense and extra labor it necessitates, not only in putting on and removing but in straightening the crispisulcant wire after having used it but once. But with the almost universal adoption of the electro-cleaner the rack has become more generally used, though not nearly to the extent it could be profitably done.

The chief causes of complaint against it are due to improper construction, which often retards the current, makes it inconvenient to handle, necessitates the soldering on of hooks which have become damaged or broken in handling, and also that the deposit at the point or points of contact is found thin. These defects can be avoided in almost every instance, and while no inflexible rule can be laid down that would be best in each individual instance, it is necessary to avoid a construction which will not overcome these troubles.

The rack which I consider best consists of a skeleton having a 3/16 in. brass rod 17 inches long and cross bars of 3/32 in. rods of 4-inch lengths, securely soldered at convenient distances, as shown in the sketch. The top is bent to conform to the size of the tank rods, and by nicking the cross pieces in the center a much stronger and neater joint can be made. This can be quickly done on a narrow-faced solid wheel. In making up a quantity of these frames—a block of wood grooved in which the parts can be laid while being soldered secures uniformity without the inconvenience of marking and holding the pieces. To the cross bars is wrapped the wire which carries the articles, and by turning one end to the right and the other left from the upright a rigid and good connection is obtained, and in case of breakage it can be almost instantly removed and replaced by a new wire. Upon the selection of these wires depends the secret of good results.

A good rule to follow is to have them of the same gauge as would be best if the work were strung up. Thus there will be no greater surface bearing on the points of contact and this will overcome the faulty deposit at these points. The almost infinite variety of work that can be racked by this arrangement and the facility with which it can be placed on and removed make stringing up look like a New York horse car compared to a Greensburg trolley, and ought to make those who still use wire begin to get wise and cut out not only this expense for labor but the enormous bills for wire charged up against the running expenses of their department.

The inconvenience of cleaning (dipping around) may be advanced as another argument against the rack, and before the electro-cleaner came into general use, with some reason. But the plater of today can in many instances carry his work through—potash, cyanide, rinse waters, plating solution—and dry it out without



RACK FOR HOLDING SMALL ARTICLES FOR PLATING.

ever removing the racks from the rod on which they are hung when the rack is filled. This method would of course require a special arrangement of not only the cleaners but of the placing of the anodes in the tank, and this brings me to the subject already referred to, the production of the maximum work from a plating tank.

One authority on this subject (Hawkins) suggests keeping the plater's time fully occupied by removing one corner of the tank while the other three are plating and replacing it with new work, consequently one-fourth of his tank remains idle while he is so engaged and it is reasonable to suppose that while his one hand is busy in slinging his wires into place the other holds a bunch of work in the solution having no contact, which if not

* Foreman plater, Kelly and Jones Company, Greenburg, Pa.

harmful is certainly of no benefit to the deposit and should be avoided. The bath should be arranged so that a whole rod can be lifted and replaced instantly by another filled with clean work, when the plating begins on all pieces at once and the time thus saved be devoted to other necessary duties.

To manipulate work in this manner the plating tank should have the conductors placed along the top of the sides of the tank, with the anode rod below and the negative above. On the anode rod bars are laid across the tank, from which the anodes are suspended. These rods, being about 12 inches apart, allow room for the rods containing the articles to be readily placed between them and rest on the minus conductor. Now by this arrangement in a tank 6 ft. long by 30 in. wide there is room for six rods of work of 30 inches or 180 inches of capacity, while with the same tank having the anodes lengthwise only 12 feet or 144 inches are available for plating, which is certainly worth considering in a day's work. The electro-cleaner and electro cyanide should also be arranged so that the work rods can be lowered and raised and rest on the positive connection, and thus the work is quickly carried until hung in the hot box or dumped in the sawdust, as the case may be.

EARLY AND LATE DAYS OF VALVE MAKING.

By John Maley.

Why is it that our valves are not as good as they used to be? Most employers making valves ask that question, and the keener the competition the more insistingly he asks it, and nearly every one concerned puts the blame on the other fellow, and he returns it. I do not refer to finished valves on the market not being as good as they used to be. Whether they are or not is not the question taken up here, but to valves cast in the foundry, and from the total cast the high per cent. of defective ones compared to the low per cent. of defective ones years ago. Is it true that this is so? Yes, it is. It is true of all makers at times, and of some makers of valves most of the time. Why is it so? That is what we will discuss.

In the old days the workman was better, took more personal pride in his work, and considered bad work as a reflection on himself. He was a good man and wanted to make good work. His employer knew him personally, and if his work was bad, told him personally of it. He worked in closer touch with the furnace man and coremaker. He told the coremaker when he was ready for his cores, and when he was ready he got them, not before. He told the furnace man when he would be ready for his metal, so that it would not be burnt by too long waiting, and sometimes he melted it himself, so that he knew just when to have his metal ready. He was a better man then because he was a man of more all round skill, and put more of his personality into his work. Today he may be a man who has not been in the country long enough to speak our language, and has absolutely no interest in his work but as to its money getting results. He does not know the furnace man or coremaker except as men who sometimes bother him, one by bad cores and the other by cold metal.

The men who do the work have changed. I will not say that the quality of all is lower than it was, but rather that there is so much more work to do that a considerable number of poorer quality have to be used. That is undeniably true. The foreigner who comes here and gets a job finally on a molding machine cannot be called a good workman until he has learned how and is satisfied to stay where he is. The wages he gets are high to him, but having no previous associations here, he will go anywhere if he is promised more money, as he has a right to, but he cannot be called a desirable employee until he is a good worker, can speak some English, and is satisfied; and sometimes he is all that and more, too. There are jewels among them, as well as among the old timers.

In the old days the molder made only a few valves, and he placed them advantageously in the mold. Or, if he made valves only, the best molder was picked to do it; so the human element was favorable in every way; either the best man was picked or the man picked the best conditions.

Now as to the metal, which, after all, is the crux of the matter. That has changed more than the man has, and permanently, too. Old metal will never again be what it once was, never. That change has come to stay, and the maker of valves who uses old metal—junk—as he used to, is walking in the rain without an umbrella. He had better get sense enough to use one. There has been a greater change in old metal-junk in the last thirty years—and I will say twenty—than in all the time previous to that. The change is radical and absolute, and as far as the valve maker is concerned, harmful to the last degree. Previous to that time any brass that was of sufficiently high copper content, no matter where it came from, under what conditions it was used, or any other consideration whatever, could be used to make a good solid valve that would stand pressure. No questions need be asked nor any doubt raised. Put it in the crucible, melt it properly, pour it and you have a good valve. Is that true today? Distinctly and decidedly not. If you get an old valve in the scrap or any old casting that has stood pressure, you can bank it. It is all right. It is the Samurai of metal, the picked, the chosen and tested. It has been tried and not found wanting. And excepting those castings used where pressure was required, there is no scrap on the market free from suspicion. Nearly all sheet and stamped metals are safe to use, but—you do not get them nowadays, because their value is appreciated.

What are the dangerous elements in scrap today, compared with former days? Well, there are enough to keep you busy dodging them. The worst is aluminum, which may be anywhere. Every one has tried it some time or other in his goods, and some firms constantly use it in small amounts, to be sure, but in sufficiently large amounts to be dangerous to use by any valve maker. He will find it anywhere and everywhere, and in unsuspected places. It bobs up when he is not looking for it, and as the melter gazes sadly at his melted metal, and sees the old familiar aluminum in the metal he wearily pours it out into ingot, unless he happens to have work that must not stand pressure, in which case he pours it into them, and so passes some "aluminum metal" onto the next buyer of those castings, when they are used and in turn become junk. No sorter of metals is clever enough to pick out castings containing aluminum. It is absolutely beyond him. If the casting as it leaves the sand could be seen it can be told, and in a general way, if he can find out what castings contain it, he can avoid them, but that idea does not work out in practice. It is a case of now you see it and now you don't. Aluminum may be anywhere in the scrap, and the largest users of scrap have found that out and act accordingly; and when you get that aluminum in your valves they leak, and no chemist or anyone else can help you. That condition did not exist years ago. Is that all? Not by a jugful. You may get metal in your scrap containing thirty per cent. of lead.

As a matter of fact, you do, and, what is more, you use it. You did not get that years ago; that is, you did not get much of it. You get very much of it today.

In those days a bearing metal contained much tin, and was a good metal really—safe to use—some of it is still used. There are still some who stick to a bearing metal high in tin, but since Dudley's experiments for the Pennsylvania Railroad, that bearing metal, which contains the highest per cent. of lead consistent with strength to bear up under the load, has the preference, and is used on all the railroads in the country. They could not put that amount of lead in, in those days if they wanted to, at least very few men could, but now all users can and do. And you may get scrap containing 40 or 50 per cent. of lead, and mixed as homogenously as metal was ever mixed. Unless you are well posted you will pass it as a red scrap. A little lead is a good thing, but when you get scrap containing so much you know you are overloaded. That metal will have metallic dyspepsia. It has too much lead in its system for valves which must stand pressure, and no purgative will help it. Simply don't put it in. Don't use it.

Are there other undesirables in the scrap? Yes, there are. You may get some nice manganese bronze. The chips, especially, look so nice. Why do they look so nice? Why, the metal is so hard that the chips get red from friction on the tool which cuts them, and you have some nice red metal chips, just as nice as the nice cat the fellow picked up, which showed its true colors afterward to everyone's sense of smell. That manganese will not pass the finishing shop, even if it does the foundry, by being used in work not requiring pressure for the very good reason that the machines are adapted to run at high speed, and they will not cut metal with manganese in it, except at a low speed, lower than they want to run.

Is the scrap containing manganese easy to detect? It is not, and on account of the iron it contains is too hard to cut, and on account of the aluminum it contains, cannot be used in work requiring pressure. They did not have to contend with that years ago. You may get aluminum bronze in your scrap, but you are likely to detect it, and as its use has lessened considerably it will not bother you much. You will get considerable iron with a thin coating of brass, and some of it will get in your metal, if you are not watchful. They did not have that years ago. You will get brittle copper, copper that you can break with a sledge easily, almost as brittle as zinc. That will not bother you very much, but it is certainly not a desirable quality in copper. You get that from the copper used in batteries, which you got in very small amounts years ago. Even copper wire over which the current has been long used, gets brittle to some extent.

You will get considerably more nickel plated stuff than you used to. Its bad effect, though, is confined to a discoloration of the metal, but every little helps or hurts, as the case may be. If the new metal for valve seats and other purposes containing a high per cent. of nickel gets into scrap, you can reckon it as one of your undesirables also. It is not a present danger, though.

So in comparing valve making in former times and today we see that the men were better qualified, even if they were not better men, which they probably were not, but that the metal used was undeniably and unqualifiedly better. The best of men could not get the results from metal today that the ordinary man could then. You might say that the valve makers should use only new metal in their valves. Well, they do not; that is all there is to that. There is some junk used in all, and, as I have shown, there is danger in all junk. Now as to molding and melting methods, which are also big factors in making a good valve. They will each of them require some space, but I will say briefly, without going into detail, that the molding methods are undeniably better, that is, that a machine molded valve of today is a better casting than the bench molded casting of former times. As to melting methods now and then, I will say, as to quality, that the old style way with crucibles gave best results. The new way, using oil furnaces, can be made as good or nearly so, and certainly can be done cheaper, which is desirable, but has been condemned by so many that until it is better known, must take—at least, has taken—a back seat.

DECISION AGAINST LOAN SHARKS.

A recent decision of the Appellate Term of the New York Supreme Court in the case of Thompson versus Gimbel Brothers marks an important step in the progress of the crusade against the salary loan sharks in New York. Employees of Gimbel Brothers, having borrowed money at rates of interest from 175 to 390 per cent. per annum on small loans, failed to make subsequent payments demanded by the loan company. The employees' wages were filed upon, but Gimbel Brothers refused to recognize the file. The loan company brought suit against the firm, and the Appellate Term has ruled that the loan company has no valid right to the wages of the employees. This court has granted leave to appeal to the Appellate Division, and the decision of the latter court is awaited with much interest. The decision of the Appellate Term in the case defended by Gimbel Brothers sustains the contention of the Russell Sage Foundation that in their present practices the salary loan companies have not complied with the Personal Property Law, and for that reason employers are not required to recognize the assignments upon borrowers' wages.

It is also gratifying to note that many employers, recognizing the need for temporary loans among small wage-earners, are providing an opportunity for them to borrow in time of pressing need. The firm of Gimbel Brothers is following up this praiseworthy defence of employees by establishing a loan department of its own which will advance money to any one on the company's payroll whose case is proved upon investigation to be worthy. Constructive measures of somewhat similar character have been undertaken in several other cities, notably by the Celluloid Company, of Newark, N. J.; the Gorham Mfg. Company, of Providence, R. I.; and the Filene Stores, of Boston. All large employers of labor would do well to emulate the example of Gimbel Brothers. Aside from its humanitarian aspect there is no doubt that the experiment will prove profitable in the increased efficiency and loyalty of employees who are to profit by it.

THE METAL INDUSTRY for May, 1910, published an article by F. C. Lawson, Superintendent of the Gorham Manufacturing Company, in which he described the methods employed by him in combating the loan shark evil. An editorial in the same number predicted that the practice would soon be either eliminated by law or put out of existence by lack of victims. The above account shows the growth of interest of employers in the financial welfare of the employed.

GROWTH OF ELECTROPLATING IN ENGLAND.

United States Consul Albert Halstead, London, England, states that the electroplating industry has been noticeably growing in Birmingham, England, many establishments using electric power from the city. In the important Birmingham jewelry trade almost all the power needed is obtained in this way.

THE ETCHING OF METALS AND STONE.

By M. Schweizer.*

M. SCHWEIZER.

When it is considered that the value of platinum is more than double that of pure gold, it will readily be seen that this expensive precious metal would not be used extensively unless results justify it. The contact points of all Western Electric telephone apparatus are made of platinum.

In this article I will speak exclusively of etching on substances, such as iron, copper, zinc, tin, silver and stone, which can be etched with nitric or muriatic acids. Care in the use and preservation of these acids is under all circumstances absolutely necessary. Aside from the necessary patterns, drawing materials, etc., there are needed for the etching itself, asphalt lacquer, turpentine, spirits of ammonia, lampblack, nitric and muriatic acids, stearin paper, modeling wax, engraving needles, drawing tools, fine camel's hair pencils and brushes, etc.

PREPARING THE METAL.

Polished metals do not take the drawing very easily and dazzle the eyes while painting; therefore it is advisable before beginning the work to rub the surface matt or to cover it with light burnt ochre.

TRANSFERRING THE DRAWING TO METAL OR STONE.

Upon stone, marble or alabaster the design which has been drawn cleanly on tracing paper is transferred by means of laying between the surface to be etched and the tracing paper with the design on, a piece of black graphite paper, and then by exactly following the lines of the drawing with a hard pencil the drawing will appear on the surface of the stone. The tracing paper must be made fast to the border or opposite side of the stone to be etched so that it will not move during the transferring. In transferring to copper, brass, iron, etc., the white stearin paper is used; upon tin, zinc, German silver use the graphite paper. Upon a surface covered with asphalt or wax ground a pattern punctured with a needle is used. This is laid onto the surface and rubbed over with pulverized chalk or rouge by means of cotton wool.

COVERING THE SURFACE WITH ETCHING GROUND.

In the performance of this work one can figure two ways. The deep and the raised etching; according to whatever way the metal is to be protected against the action of the acid. In the first place by deep etching the whole surface is covered with asphalt lacquers or wax with mastic and asphalt mixed. Upon this etching ground the design is transferred and then with an engraving needle or sharp pointed knife the design is taken out, which, after the etching process is complete, will appear engraved on the metal. By the raised etching process the design is first painted upon the surface of the metal or transferred from a design on tracing paper, and then the pattern itself is painted in with asphalt lacquer. All fine lines can be drawn in with the etching needle. If in painting the asphalt lacquer should prove to be too thick, then it can be thinned down with turpentine. Always use fresh asphalt lacquer and not the kind that has stood for a long time.

EXAMPLES OF ARTISTIC EFFECTS IN ETCHED WORK ON METAL.

THE ETCHING ITSELF.

When the entire parts of the article, which are to be preserved from the action of the acid, are coated with

asphalt lacquer, wax, etc., and this coating is fully dry it is laid into a porcelain dish with water one inch above the surface of the article to be etched. This is to be especially recommended for small work. Pour the acid into the water, drop by drop, stirring constantly. The raising of small bubbles in the water goes to show that the process of etching has begun. The time required to complete the etching depends upon the kind of metal or the strength of the acid and may take from ten to twenty minutes, or it may require an hour or more to complete. The rule for this is that the asphalt paint must be sufficiently raised before the work is removed from the acid.

Regarding the strength of the acid for different metals the following will be found good as a rule: Copper, brass, German silver, tin and iron require one part of nitric acid to two parts of water. Stone, and especially alabaster, require the addition of acid by drops only, and will give better results by using a weak acid and allowing plenty of time for the etching. If during the process of etching some of the asphalt lacquer should peel off, remove the work from the acid, dry it off with a cloth and cover the exposed parts with lacquer; after this is thoroughly dry the etching process can be proceeded with as before. After the work has been etched sufficiently deep it should be thoroughly rinsed with water and laid into a bath of water mixed with ammonia, which will stop any further action of the acid. Finally the work is cleaned off with turpentine or benzol.

FURTHER DECORATING THE ETCHED WORK.

If the design upon the metal is desired to show up with more effect, color it black; for this, a mixture of asphalt lacquer, turpentine and lampblack the thickness of thick cream will answer. The surface is covered with this mixture by means of a brush and left to dry for twenty-four hours and then very cautiously rubbed over with a soft linen cloth moistened with benzine until the raised design will show up bright. The background may be oxidized black before the acid resist is taken off. This also will improve the appearance of the work. Zinc and tinware will improve in appearance if, after etching, they are silver or nickel plated. In my next article on etching I will describe a process by which very excellent work can be done by taking impressions from engraved copper or steel plates and transferring to articles of manufacture, such as souvenirs and toilet articles, tableware, sign plates, machinery name plates, clock dials, lamp shades, hardware, etc.

THE ADHESION OF ELECTRO-DEPOSITED SILVER IN RELATION TO THE NATURE OF THE GERMAN SILVER BASIS METAL.*

By Andrew McWilliam, A.R.S.M., M.Met., and W. R. Barclay, A.M.I.E.E.†

INTRODUCTION.

A few years ago the authors had their attention specially drawn to a rather serious trouble in connection with the behavior of high-quality electro-plated spoons and forks under very severe conditions of wear. It is well known that at the present day a much larger proportion of such goods made are used in hotels, in steamboats, and by caterers than formerly. Owing chiefly to the necessities of the case, but partly to the destructive instincts of virile humanity, these goods are subject to very much severer trials than they would have undergone had they found their way into use in the service of private families, for in hotels, spoons and forks may have to be gathered up into large baskets and thrown into the receptacle in which they are to be washed, a kind of treatment that must be remembered in considering what follows.

A large quantity of spoons and forks, manufactured presumably under the best commercial conditions, examined and passed by experienced observers before being sent out from the factory, and apparently only differing from ordinary products in having an exceptionally heavy deposit of silver, were, after actual usage for eighteen months or so, returned to the makers with the complaint

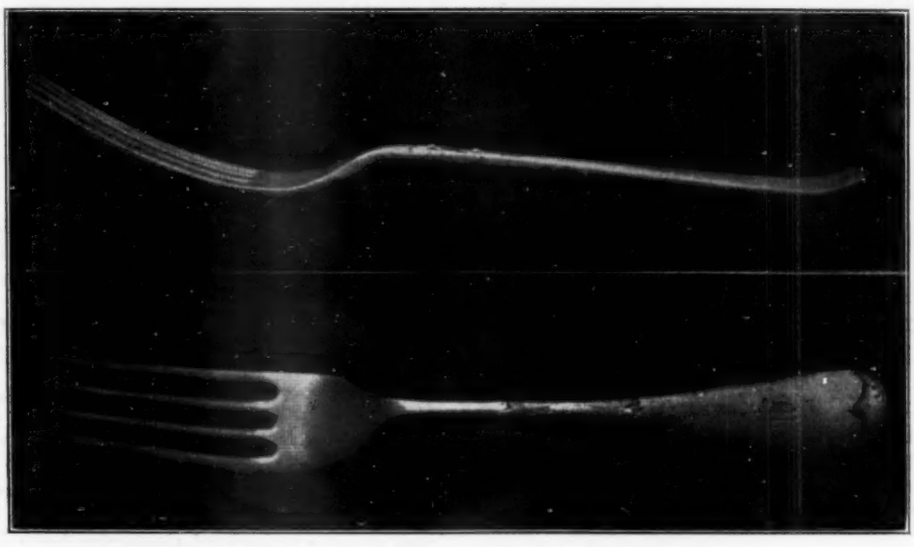


PLATE I.
FIG. 1. UPPER. FORK SHOWING STRIPPING OF SILVER COATING.
FIG. 2. LOWER. FORK SHOWING STRIPPING BEGINNING AT THE EDGES.

*Paper read at London meeting, Institute of Metals, January, 1911.

†Respectively Assistant-Professor of Metallurgy and Lecturer in Electro-Metallurgy in the University of Sheffield.

that the deposited silver coating was "peeling" or "stripping" along the edges and from parts of the surfaces of the articles.

Figs. 1 and 2 (Plate I) will give an idea of the way in which this occurs.

As the trouble was not confined to a few isolated pieces, but extended to the majority of the articles in a consignment, and was also in time found to occur in connection with goods from different firms, it was felt that the matter warranted a thorough investigation, particularly as no specific fault could be traced in any of the processes through which these goods had passed, where the details of the processes could be known. A full inquiry into the causes of this fault was made by request, and since the first part of the investigation was finished, quite a number of similar cases have been brought to the notice of the authors from independent sources and by personal observation. Thinking, then, that the subject was one of vital importance to electro-plate manufacturers, as well as of great interest in connection with the non-ferrous trades, with the concurrence of the gentleman who first asked for the investigation to be made, the authors determined to place the results of their experiences before the members of the Institute of Metals, supported as they are by further experiments recently carried out.

In order to correct a misapprehension which might arise, it may be necessary to point out that no attempt is here made to discuss the ordinary causes of the "stripping" or "peeling" or "blistering" (as it is sometimes called) of electro-deposited silver from the basis metal during processes of manufacture, such, for instance, as that due to inefficient cleaning from grease or from oxide, careless treatment in scratch-brushing, or in the general preparatory stages of treatment, unsuitable plating liquid, etc., because articles so treated rarely pass from the hands of reputable manufacturers, the faults being revealed during the subsequent finishing and burnishing processes, it being well known that if the slightest trace of grease or oxide remain on the surface of the basis metal, the electro-deposited silver will blister under the pressure of the steel burnishing tools used in finishing.

The investigations were conducted from an entirely different point of view, the authors being convinced that the stripping of silver from articles which had passed all the ordinary tests of the manufacturer, and had indeed been in the hands of the users for periods varying from six months to two years, could hardly be ascribed to any of the ordinary causes mentioned.

From general experience, and from the examination of many plated articles that had been a generation in wear, the authors had formed the opinion that the adhesion had something to do with the nature of the basis metal, hence the investigations described in the present paper were undertaken with the view of determining not only the nature of the adhesion of electro-deposited silver to the alloys known commercially as German silver or nickel silver as a basis metal, but also to find out what difference, if any, exists between the various grades of German silver in general use in the trade, as to their suitability to form a basis metal for heavily electro-plated articles which are liable to receive rough usage. These investigations are described under the following heads: (*a*) Samples tested, (*b*) Tests applied, (*c*) Results of tests, (*d*) Conclusions.

(*a*) SAMPLES TESTED.

The earlier experiments were made on a number of spoons and forks of various sizes supplied by manufacturers, and of the grades known in trade circles as Firsts, Seconds, Thirds, and Fifths. Analyses of these were not made, but the makers reported them as having approximately the following compositions as to nickel: Firsts, 20 per cent.; Seconds, 16 per cent.; Thirds, 12 per cent.; Fifths, 7 per cent. The content of copper appeared to vary between 56 and 59 per cent., according to the few assays made. In addition to these spoons and forks, several test strips were obtained of each of the grades described, and of a similar character to spoon and fork blanks. All the pieces were treated so far as possible in exactly the same manner, and cleaned, prepared and electro-silver-plated, according to the best methods in general use, with the one exception that a few of the samples were given a preliminary coating of copper before silver-plating. The silver deposits given to these were equal to the highest qualities for high-class work and the electro-plating was done by experienced workers, under the ordinary conditions of works practice. The experiments on the above pieces were carried out several years ago, and samples were electro-plated in different works. Those which will now be described have been made under the personal supervision of the authors during the last twelve months, as, in order further to test the matter, in view of the possible publication of results, they determined to prepare a series of nickel silver alloys corresponding approximately to those in ordinary use among electro-plate manufacturers.

The following table gives the compositions of the alloys, accordingly made:

TABLE I.

Marks.	Nickel. Per Cent.	Copper. Per Cent.	Zinc. Per Cent.
A	20	57	23
B	18	57	25
C	16	57	27
D	14	57	29
E	12	57	31
F	10	57	33
G	8	57	35
BZ	18	50	32
BC	18	64	18

The choice of the above alloys is largely empirical, but they are fairly representative of the usual grades of copper-zinc-nickel alloys in commercial use. An endeavor has been made to systematize the series by fixing the proportion of copper on the uniform basis of 57 per cent. throughout, with the exception of the last two members, BZ, in which 7 per cent. of the copper is replaced by zinc, and BC, in which 7 per cent. of zinc is replaced by copper. As the authors have the work well in hand for a paper on some of the properties of this series of alloys, no attempt is here made to discuss this aspect of the subject, but the whole series has already proved a remarkably successful one with regard to desirable working properties.

Each alloy has been made under the ordinary conditions of works practice, manganese being used as a deoxidizing agent. The metal was cast into ingots of about 18 lbs. weight. These were rolled into sheets of a thickness and width suitable for spoon and fork blanks, and cut up into strips each 8 ins. long and varying from ½ to 1 in. in width. In every respect these strips correspond to spoons or forks with the exception that they have not undergone the process of stamping. A few odd strips from some members of the series have been made into forks, and these have been submitted to tests in the same way as the blank strips. The electro-silver-plating of these strips has been done under the best commercial conditions of manufacture, in an electro-plating shop through which large quantities of spoons and forks are daily passing. They have been prepared for the depositing vat with due care and with all the precautions which would be taken by any careful electro-plater to ensure the best adhesion of the silver deposit.

(To be Continued.)

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ENGLISH IMPRESSIONS

ENGLISHMEN VISIT AMERICAN BRASS ROLLING MILLS.

At a meeting of the Birmingham, England, Local Section of The Institute of Metals, held at the White Horse Hotel, Congreve street, Birmingham, February 14, 1911, G. A. Boeddicker, Chairman of the Section, read a paper on "A Visit to Some Rolling Mills in America," in which he recorded the impressions he had formed during a recent visit to some of the metal works in the United States.

Most of the firms were well up-to-date and using modern machinery driven by electricity. Rolls, however, were generally driven from a jack shaft, a convenient arrangement by which any number of rolls could be placed side by side without being coupled together, this enabling the speed of the different rolls to be varied as desired, while a breakdown of one or another did not interfere with the whole train. The speed of the driving engines being from 75 to 100 revolutions per minute. The boilers used were of the Babcock and Wilcox water-tube type, and the engines were all slow running, whilst great attention was given to the design and upkeep of the power stations, these being kept spotlessly clean.

Great care was taken to use only pure metals for the alloys, the copper used being mostly Calumet and Hecla, whilst the spelter was of exceptional purity, containing only 0.04 to 0.1 per cent. of lead, and even if the alloy to be produced should contain lead, only pure spelter was used, and pure lead added to the alloy. The casting was done on a large scale, but owing to the fact that casters' lads were not employed, laborers without experience were sometimes put to the casting of German silver, with the result that it was not so well done in England.

The furnaces were mostly of the round type; the fuel anthracite, and 160 lb. pots were generally used; the metal being cast into ingots of 75 to 100 lbs. For narrow metal the ingots were 6 ins. wide, while for sheets they were 12 ins. When pouring, a small funnel was put on the top of the mould. It was lined with fireclay, and had four holes in the bottom to split the metal. All slag and charcoal remained in the funnel, and could not get down into the mold. A similar plan was used in casting rods, these sometimes being cast in split and sometimes in solid molds; the latter being open at the bottom and fitted with a plunger about 6 ins. long. When the rod was poured and had set, but yet whilst red hot, the plunger was pushed up 4 ins. or 5 ins., which pushed up the rod, and there it was left until quite cold, when it could easily be taken out of the mold.

The Americans took great trouble in cleaning the surface of the ingots before rolling. Sometimes they were scraped all over on a scalping machine, and at other times they were planed, in which case a thickness of ⅛ in. would be taken off from each side of an ingot 1¾ in. thick; this meant about 14 per cent. of scrap from one operation alone. He was thankful that this process was avoided in British practice. The rolling mills ran at greater speeds than over here. At Waterbury they "broke down" at 10, "got down" at 22, and "finished" at 45 revolutions per minute, while at the Riverside Mills, they "broke down" at 20, and "finished" at 50 revolutions. As a result of the speeding up, a pair of rolls probably got through two or three times as much work as in this country. The rolls were fitted with automatic coiling arrangements for coiling the strip as it was rolled, this being necessary by the length of the strips, which would otherwise be too long for the annealing furnace. The annealing was done in oil-fired furnaces, sometimes at the same temperature as in this country, and sometimes at a higher temperature. The metal was carried from the rolls to the muffle

on a tray, and lifted bodily into the furnace by a simple pulley arrangement, the whole operation only taking a few minutes. A charge of 20 to 30 cwt. would be left in the furnace for an hour to an hour and a half. Narrow strips were not put in flat, but were placed in edge sideways between pegs riveted on the tray, so that no two strips touched each other. When the metal was withdrawn from the furnaces, it was quenched by a jet of water. The furnaces were generally 15 ft. long by 6 ft. wide.

The gang slitters and shearing machines were fitted with automatic scrap cutting devices. There were pickling, brushing and drying machines, and overhauling machines for thin strips, the metal passing over several rollers, and one man inspected one side and another man the other.

In the large Waterbury wire mills, the wire was transported from the blocks to the annealing furnace, then to the pickling shop, and back again to the blocks by means of overhead electric trolleys. Apart from the bull blocks, continuous machines of the Waterbury type were generally used. The English practice of rolling bars, slitting them, and drawing the slittings was practically abolished, and rod rolling had been introduced not so much for the sake of economy, as in order to get rods of 56 to 60 lbs. For pin wire, or any other wire down to 18 or 20 gauge, which was not required in heavy coils, the English system was probably quite as economical as rod rolling. The annealing furnaces for rods were open cylindrical furnaces, which could be conveniently charged by means of the electric trolley overhead. All the plant was electrically driven, and in one case, the motors were placed beneath the floors, and connected to the machines above by means of short belts.

In the discussion that followed, Mr. J. W. Earle said he agreed as to the inferiority of the American casting, which resulted from the use of rough iron molds, or insufficient care in scraping or dressing them. One of the things he noticed was the large number of men employed on some of the rolls, five men being engaged on the breaking down rolls. But he admitted that each man did very useful work. What struck him most, however, was the number of costly subsidiary machines employed. These were so numerous and important that the rolling mills themselves were almost lost amongst them. The lists of sizes issued by American manufacturers to their customers were of a more definite character than those used in this country.

Mr. G. H. Dugard said he had noticed strip taken into the mills in America, which would be promptly rejected in this country. As a rule, however, it was put on an overhauling machine, but even after it was scraped, the spills sometimes remained. The finished metal, however, was quite satisfactory.

Mr. Bean, during a humorous and witty speech, said that they were engaged in the metal trade to make money, but judging by the financial records of the past few years, one might think differently, and whilst British manufacturers at times made something verging on a profit, American mills were able to pay 12½ per cent. to their shareholders."

While the reflections of our English visitor are interesting and he shows a commendable thoroughness in his observations compatible with his opportunities, it must be remarked that he is not altogether accurate in his conclusions. This is probably not his fault by any means, but is due no doubt to the fact that a few mills only were visited and their practice was taken to represent that of the industry. For instance he remarks upon the purity of the spelter used and says that even if leaded alloys were to be produced the pure article was employed and lead is added. He also says that the spelter employed contains lead from .04 to 0.1 per cent. If this were true it would shut out from the great brass-producing district of this country all of the spelter produced in the great zinc belt of the West. There is not a single brand of spelter produced known as prime Western spelter, that we know of that would come within this provision. In the manufacture of all kinds of brass these Western spelters are used, and if leaded metal is being made, due allowance is made for the lead, which sometimes runs as high as one per cent. in the spelter alone.

It is a matter of fact that as much, and frequently more lead than Mr. Boeddicker mentions can be found in ordinary commercial common brass. The high-grade spelters of New Jersey, Pennsylvania and Virginia are mostly used for the better grade of "high" brass for drawing and spinning purposes and for the manufacture of sheet zinc and spelter castings, etc. The Western brands are used for the manufacture of the great bulk of brass and bronze made either in wrought or cast form.

One prominent zinc company, to our knowledge, ships into the brass district of Connecticut between two and three million pounds of its spelter per month, and they do not claim a lead content less than 20 per cent.

In relation to the casting of German silver, he attributes the presumed inferiority (?) of the American product to the employment of inexperienced help in the casting process. If any German silver manufacturer was so foolish as to put green hands over his German silver fires he certainly would deserve no sympathy. The makers of this metal in particular are very jealous of their success, and the men who make the metal are very carefully and thoroughly trained and paid high prices when they are finally put in charge of the work.

Mr. Boeddicker calls the runner box set on the top of a mold, to divide a stream of metal and distribute it uniformly in the mold and also to keep out dross, etc., a funnel and says it is lined with fire clay. This is not general practice, however, the runner boxes are usually simply given a coat of lard or whale oil, in which has been mixed a little graphite in order to prevent the molten brass from sticking to the iron box.

The practice of scalping or overhauling, comes in for considerable censure and is also somewhat exaggerated, or Mr. Boeddicker saw either some extraordinarily bad metal or some special work going through. No mill would ever sanction a loss of fourteen per cent. in overhauling scrap; from three to five per cent. is as high as it ever goes with a chip from one-thirty-second to one-sixteenth of an inch in its thickest part. Our English friends should be reassured when they learn that the overhauling process is gradually dying out. Already in the West among the newer mills that can draw away from traditional practices we find that this wasteful practice is being dispensed with. In fact there are several mills in the Waterbury, Conn., district that overhaul only metal made from dirty scrap, etc.

The overhauling process has always seemed to be more or less of a curious analomy anyway, for the chips that are taken off and supposed to contain dirt, etc., are sent to the casting shop and put into the pot with new metal, thereby introducing the same dirt (?) into the new batch to be overhauled again. Mr. J. W. Earle is entirely correct when he remarked that the dirty metal of the American shop is due to rough and dirty iron molds. This is so and the principal reason for this is over-oiling of the mold. A too profuse coat of oil is usually used, and

the unconsumed residue, together with particles of dross caught by the oil, makes a cake on the surface of the mold which furnishes the fine particles of "dirt" afterwards appearing on the surface of the metal bar.

American ingenious and labor-saving machinery comes in for considerable wonder and there the visitors struck the keynote of American supremacy in the manufacture of brass, proof of which is shown in the balance sheet and the stock value of the American brass mill company. As competition increases the development of the business, it demands more pounds of metal per day at a less and less production cost. Human ingenuity is taxed to its utmost and the result is the large number of almost human machines in use today in all branches of the brass industry. It is after all as Director Bean remarks, "The Americans are in the business for profit, while the more conservative English mill might seem to regard the industry as a pastime."

CANADIAN RECIPROCITY

Judging from the reports received from various parts of the country, as voiced in the daily press and in a smaller way by our own correspondents in the larger cities and Canada, published in this number of THE METAL INDUSTRY, consensus of opinion is in favor of the Reciprocity Bill now being discussed in Congress. It is to be hoped that this bill will pass, for a little careful reasoning will convince any one that reciprocal relations as to tariff reductions, and in some cases complete abolishment, will work for good for both the United States and Canada.

Canada is our neighbor, with a common border line of over 3,000 miles. With her vast agricultural and mineral resources, she cannot fail to benefit immensely by having the markets of the United States thrown open to her. And on the other hand, to receive free of duty just the things she most needs from the United States will certainly lower the cost of living to a material extent.

A general analysis of the bill as presented to the 61st Congress, 3rd Session, and printed in Senate document number 862, is as follows:

The trade of Canada with all the world is now approximately $700,000,000. In the last fiscal year for which official statistics are available, that of 1910, the actual trade was $655,000,000. Of this amount the imports were a fraction under $376,000,000, and of these imports $223,500,000 came from the United States, as against less than $153,000,000 from all the rest of the world. The population is about 7,500,000. As a customer of the United States it therefore appears that the Canadians buy $30 per capita. This is a very remarkable showing and illustrates how valuable the market is for our surplus agricultural and other products. It is a pretty effective answer to those who complain that we are trading the market of more than 90,000,000 people for that of a comparatively small number

From an analysis of the Canadian statistics it appears that the Dominion in the fiscal year referred to exported to the United states products to the value of more than $104,000,000. Our own import figures for the last fiscal year, nine months of which are identical with the Canadian fiscal year, show imports of $98,000,000. The import figures of any country are always somewhat under the export figures of the corresponding country. We may safely assume that we are now taking from Canada $100,000,000 and sending her in return more than $225,000,000. It happens that the articles we take from Canada are those needed by our own consumers, largely raw materials, because Canada is only in the initial stages of her industrial growth and has vast resources of reserve raw materials, on which we naturally draw. These include lumber in all forms and various mineral products, as well as some agricultural products. The bill to carry out the reciprocity agreement proposes to enlarge these mutual markets and to facilitate the interchange of the various products of both countries across the border line in the interest both of producers and consumers.

The basis of the agreement is a reciprocal free list on food products both for man and animal. These include the cereals, fresh fruits and vegetables, fish, cattle and other live animals, eggs and poultry, brass in bars and rods not less than 6 feet in length, or in strips, plates or sheets not polished, planished or coated. The free list also specifies various articles now free in one country which are to be mutually free. For example, rough lumber, which is given free entry into Canada, is also to be given free entry into the United States. Cottonseed oil is to have the present heavy duty removed by Canada.

Supplementing the reciprocal free list are identical rates which are reductions from the rates now prevailing in both countries on secondary food products, such as bacon and ham, fresh and canned meats, and various other packinghouse products, canned vegetables, flour, cereal preparations, and various foodstuffs partly manufactured.

There is also a mutual list of rates on various manufactured commodities, including agricultural implements, and a small list of articles which are given special rates by each country.

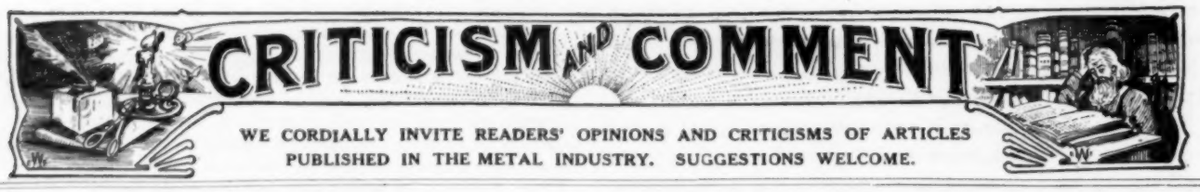
In its effect on the respective revenues it appears from the tables compiled by the Bureau of Trade Relations of the State Department that the United States will remit duties to the amount of $4,850,000 and Canada to the amount of $2,560,000. When it is know that of the duties remitted by the United States more than $1,600,000 are on lumber and nearly $500,000 on fish, there will probably be little complaint on the part of the American consumers because of the difference in the amount of revenues respectively remitted by each government. Actually the discrepancy would be very small, since lumber is already admitted free into Canada.

Another important matter relative to tariff matters before Congress is the appointment of a permanent tariff revision board. The appointment of such a board would put the tariff question out of the hands of politics for all time.

To have the tariff agitation settled definitely would act as a governor on business conditions and gradually set the wheels of commerce, both domestic and foreign, moving in well-regulated and orderly fashion.

COMING CONVENTIONS

In the "ASSOCIATION AND SOCIETY" department of this issue of THE METAL INDUSTRY is published an account of the preparations now being made for the holding of the annual convention of the Allied Foundrymen's Association, to be held in Pittsburg, Pa., May 23 to 27, 1911. In connection with this convention is held the annual exhibition of the Foundry and Machine Exhibition Company, at which is shown everything new and up-to-date in the way of equipment and supplies for modern foundry practice. From all the evidence now in hand the convention and exhibition promises to be the largest and most successful ever held. Too much cannot be said regarding the value of this occasion to manufacturers and foundrymen, both employer and employed, and we strongly advise everyone connected with the foundry trade to make plans to attend. As there will certainly be a large attendance, it is recommended by those in charge of arrangements to engage your hotel accommodations in advance.


CRITICISM AND COMMENT
WE CORDIALLY INVITE READERS' OPINIONS AND CRITICISMS OF ARTICLES
PUBLISHED IN THE METAL INDUSTRY. SUGGESTIONS WELCOME.

NICKEL PLATING

To the Editor of The Metal Industry:

The communication from Mr. Brown, appearing in your last issue, deserves an answer; and as he has stated that "criticism will be welcomed" I beg leave to submit some additional comment on his views on nickel plating.

In the electrolysis of a nickel solution there is not the violent decomposition with the liberation of ammonia by "wholesale" that Mr. Brown speaks of. The statement that a nickel solution "when in good working order, there is no 'gassing'" is not quite correct. There is always a slight evolution of hydrogen. Where there is no decomposition of the electrolyte no deposition can take place. Minute bubbles of solution carrying hydrogen gas may be seen rising from the cathode to the surface of the bath. The hydrogen may be easily collected in a test tube by the displacement of water. The test tube is filled with water and inverted over the bath at the work rod, and a copper wire run from the rod to the mouth of the test tube. Similarly oxygen may be collected if the anodes are new or thoroughly cleaned. To shorten the time in collecting the oxygen gas the anodes should be removed.

The reactions given in my first communication are a law of electrolysis, as established by Faraday and on which all authorities agree. In Ewell's "Physical Chemistry" (1909) page 294, it is stated: "If the anode is a metal of which the electrolyte is a salt, the anions are not liberated, but an equivalent of metal cathions goes into the solution. The amount of metal dissolved at the anode will equal that deposited at the cathode." This condition may be closely realized in practice. McMillan, in his work "Electro-Metallurgy," page 234, states: "The ammonium salt under electrolysis deposits sulphuric acid upon the anode, which by combining with it, adds an equivalent weight of nickel to the bath, while it throws down the elements of the hypothetical body ammonium (NH_4) upon the cathode." We agree with Mr. Brown that NH_2 liberated at the cathode interacts with water to form NH_4OH, but this is presumed to break up into the ions NH_4 and OH. Referring to Lupke's "Elements of Electrochemistry," page 27, it is stated: "The radical NH_4 interacts with water similarly to potassium and six volumes of hydrogen are produced at the cathode. The oxygen which is separated from the 6OH ions oxidizes two molecules of ammonium hydroxide to water and nitrogen. And thus it is that the volumes of hydrogen and nitrogen produced are at the ratio of 3 to 1." This well-known and characteristic reaction takes place wherever NH_4 is present. The same authority gives a lengthy equation illustrating this reaction, which is unnecessary to reproduce here. The happy thought of "bottling up" the hydrogen and nitrogen, however, would not be a paying business, as the evolution is too slow.

The weakness of Mr. Brown's excellent article is in the statement that "all replenishing should be done with the single salts." If the single salt is used exclusively the solution will finally reach the point where it will be impossible to obtain a white adherent deposit of ordinary weight. If any plater doubts this let him try a solution of the single salt alone for plating. The result is usually a dark muddy film which is not adherent and is of no value. If the solution is concentrated and kept from 15 to 25 degs. Baume, it is possible to obtain a flash of white nickel; but in about thirty seconds the deposit assumes the color of cast iron.

As stated in my first communication a sulphate of nickel solution was first described in 1842—in the *Pharmaceutical Journal*, Volume III, pages 358-359. The title of the article is "A Few Remarks on the Nickelizing and Platinizing Metals by the Galvanic Process." The many plating plants that the writer has visited in the East are not using it, and the only bath recommended by Van Horne, Hawkins and Bedell is the double sulphate of nickel and ammonium with only slight additions of the single salt. It is true that the supply houses sell large quantities of sulphate of nickel, but this does not prove that it is used *per se* for nickel plating. Many platers use it in conjunction with the double salts to stop pitting, and building up solutions that have been let run down; and also for making nickel carbonates.

It may interest your readers to know that a nickel nitrate solution was the subject of the first patent in nickel deposition granted to Joseph Shore, in England, in the year 1840. The bath was used by Roseleur and other experimenters in the early days of electroplating. Of course, this solution is not practical and was not used to any great extent. It was the intention of the writer to convey the fact that nickel carbonate has been used in a solution of KCN for nickel deposition and it was unnecessary for Mr. Brown to state that it could not be used for the reason that it is insoluble in water—a fact that all platers are aware of. Mr. Brown's contribution closes with the statement that "The article is the result of experiments in a practical way, combined with the reading of books and papers," and credits Langbein "for much of the information herein embodied." Mr. Brown's apothegm should be made to read: "A little experience as well as a little knowledge is a dangerous thing" when one attempts to write on such a trite subject as nickel plating.

Electro.

POLISHING WHEELS

To the Editor of The Metal Industry:

In reply to the criticism of my article on the "Care, Use and Abuse of Polishing Wheels,"* by Mr. Divine in your March number, I wish to say that as a practical polisher and plater of twenty-seven years' experience I am not boosting anybody's wheels in particular nor am I trying to influence public opinion in any way. My object in writing this article, which, by the way, is but the beginning of a series of articles that I expect to write, is solely instructive, and as I have had a wide experience with the various makes of wheels and also having made many myself, I trust that my humble efforts may be of benefit to some who have not had the opportunity or experience which I have had. I am also ready, at any time, to answer any questions from anyone interested in the use of polishing wheels that I may be able to answer.

The reason I have taken up the wooden, leather-covered wheel first, is that it is the oldest wheel that I know of and also the most easily made, and I believe the best wheel for flat surfaces, where a square edge must be maintained. In Mr. Divine's criticism he claims tthe wooden, leather-covered wheel does not contain the elements of flexibility, resilience or lively action or run smoothly. To this assertion I take exception and, if necessary, can prove to him that it does, when properly made, contain all of these elements. While it does not adapt itself to the various contours or shapes of the different forms of a piece of work, there is no other wheel known to the trade that will do as good work on flat, straight surfaces as will this particular kind of wheel.

However, I do not wish to go to any lengthy argument on this subject at present, and I am sure that Mr. Divine or anyone interested, who will follow my article to the finish, will, if they are practical men of the trade, either in the manufacturing of the wheels or as polishers, derive some benefit therefrom, and at the same time I should be very much pleased to hear from all who desire to comment upon and criticise my article. While there are many things I may see and write about, my opinion and experience may not be the same as others, and it is by hearing from many on the same subject that we all must learn. And as the law of progress is to acquire knowledge, we learn by giving, and as I had never seen an article published on this subject I thought of writing about it.

*The Metal Industry, February, 1911.

I agree with Mr. Divine that the practice of setting up or heading wheels late in the afternoon and putting them to work next morning is not good practice. I should like to say that in all my experience with manufacturers or owners of factories it is next to impossible to get wheels enough to last one day for each man in a polishing department, and in many places where I have been employed as foreman my men have had to take on their work at the rate of one-half a day's work at a time, so that they could use the same roughing out wheels in the afternoon that they had used in the morning. Consequently, I am very glad that this question was raised by Mr. Divine. If the manufacturers who need polishing wheels only knew how much glue and emery they were wasting every month on account of not having at least two sets of wheels for each man they would, no doubt, order a duplicate set at once.

Artificial drying of glue is only a waste of emery and glue, and consequently a loss of time and wear and tear on the wheels. A practical man can see this, but it is a hard matter to convince a factory superintendent or manager or buyers of this fact, as no one knows better than I do. I know of no department in a factory so much neglected in regard to this one thing, namely a good supply of tools. Wheels are the tools in a polishing room. Forty-eight hours should be the minimum time limit for drying glue on newly headed or set up wheels. While artificial heat is bad for it, there is hardly any other way of drying the wheels, as the room where the wheels should be dried must be warm summer and winter, but an even temperature of about 68 to 70 degs. should be maintained in the summer time. Artificial heat must be provided for the wheel room to overcome the dampness of the nights and rainy days. I trust that I have made myself clear, that Mr. Divine will take this answer in good faith and that it will also clear up all of his doubts and fears as to the object of my writing.

T. C. EICHSTAEDT.

Detroit, Mich., March 26, 1911.

Shop Problems

IN THIS DEPARTMENT WE ANSWER QUESTIONS RELATING TO SHOP PRACTICE OF THE METAL INDUSTRY ADDRESS THE METAL INDUSTRY.

ALLOYING

Q.—I desire to add from 10 per cent. to 30 per cent. cadmium or aluminum to a 15 per cent. German silver mixture. How can this be accomplished without blowing the metal from the crucible when the cadmium is introduced into the melted German silver?

A.—You should have no difficulty in introducing the above mixture. Cadmium melts at 608 degs. Fahr., zinc at 840 degs. Fahr., and aluminum at 1,200 degs. Fahr. These metals should be added to the main portion of the melt just before the crucible is taken from the fire and should be simply introduced gradually in the same manner as spelter to avoid ebullition which might be caused by too rapid introduction.—K.

Q.—Will you please tell us how to make up the following mixture to avoid lead sweat?

Copper	80
Lead	10
Red Brass Scrap	15 to 25

consisting of valves, trolley wheels and fittings? Also would it be possible to add 15 of lead to 80 of copper?

A.—You can add 10% or 15% of lead to the mixture you name provided the tin is kept below 4½%. It is also necessary to avoid oxidizing the metal, even in the slightest degree. If this last point is observed, alloys of 50% copper, 50% lead can be made without any separation whatever occurring.—J. L. J.

COLORING

Q.—We do the bluing of tools with saltpetre and would like to know if it is not possible to add something to this saltpetre that would blacken the tools?

A.—By the addition of a small amount of peroxide of manganese to your saltpetre bath a dark tone approaching a black will be produced. A method that is being used extensively by the manufacturers of tools and hardware consists of the following formula:

Phosphoric acid	4 fluid ozs.
Iron filings	1 oz.
Water	1 gal.

The solution should be used at the boiling temperature and the articles immersed for two to three hours. Tanks of wood or enameled iron should be used for the purpose. After the surface becomes sufficiently coated remove the articles, drain well and then dry by the aid of heat. Do not use water in connection with these operations. When the moisture is all absorbed, immerse in heated linseed oil, the excess of which should be removed by any of the usual methods.—C. H. P.

CORRODING

Q.—We are endeavoring to find a cheap metal or coating for a metal seal for bottles that will not rust or corrode when coming in contact with prepared mustard or olive brine. We have tried several metals, such as zinc, brass, nickel; also lacquers, and any information that you can furnish us will be appreciated.

A.—We would suggest that you try the American Rolling Mill Company's ingot iron or nickel iron. Each of these materials resists corroding agents in a high degree and if well tinned would have the surface finish and stiffness that your seal requires.—J. L. J.

DIPPING

Q.—Please tell us in your next issue what is the best parting or coating to use for the purpose of parting castings, such as hinges which have the wires cast in to save the fitting up?

A.—Dipping the wires in melted rosin is the process used by some brass molders. Dipping the wires in painter's Japan and then dusting them with pine sand while they are still "tacky" is another method that is recommended.—J. L. J.

FINISHING

Q.—How can we obtain, by staining or otherwise, a rich scarlet and crimson on copper?

A.—The color you refer to is known commercially as Royal Copper, and is imitated upon copper by the aid of lacquer enamels. A method for producing Royal Copper was given in the February, 1911, issue of THE METAL INDUSTRY.—C. H. P.

Q.—Will you kindly inform me through your valuable paper what is to be understood by "Russian Brass," also what is "old brass finish," and how is it made?

A.—"Russian Brass" is what is known in this country as smoked brass. To produce this finish, which gives the best results on hammered brass, proceed as follows: For jardiniere work revolve in a lathe and then apply No. 00 emery mixed with oil. Use cloth or waste for this purpose. When you have produced a good even finish, wash the articles with benzine or gasoline, then apply a thin coating of linseed oil. Let the oil dry for some time, then heat over a smoky flame. When the articles are cool scour down with emery only with a to and fro motion to give an idea of removing the fire coating in the old way of years ago. After this operation the articles may be lacquered in any of the usual ways.

Old brass finish is also known as brush brass, dull brass and satin finish brass. To produce this finish the articles should receive the regular acid dips, then scoured down as mentioned for Russian brass, washed in benzine, dried and lacquered. Or the articles may be cut down on the regular buffs, using tripoli composition. Then wash with benzine and scour down with pumice stone and water, using a revolving tampico bristle brush. Then washing, drying and lacquering, or tse same methods may be used as regards the cutting down, washed and scoured with brass wire, scratch brushes, using pumice stone and water.—C. H. P.

HARDENING

Q.—I have a number of dentist's burs to harden and am having trouble with them scaling. Can you advise me how to overcome this?

A.—The articles you mention may be packed in powdered charcoal in an iron box, heated to the proper temperature and then dumped into water, box and all. Instead of water, sulphuric acid may be used for the tempering.—J. L. J.

NICKEL PLATING

Q.—I have forwarded you two samples of work on which I would like to have your opinion. The broken piece was taken out of the tank after the current was shut off about one hour. The panel was left in the tank over night. The solution stands at about 6 deg. Baume. Anodes run about 85 per cent. nickel. The solution has been allowed to run down on account of approaching cold weather. Ammonia has chiefly been used to neutralize the acid in the solution.

A.—Your trouble is due to the fact that your solution is deficent in metal. It is a poor policy to let a solution run down on account of the variation of temperature between winter and summer. It is far better to heat the solution to increase the temperature. This can be accomplished very quickly if you use steam, by having placed in the tank a straight coil of one-inch lead pipe, connected with a steam pipe with valve to open and close as required. The passage of the steam will in a very short time raise the temperature of the solution to 70 deg. or more. Ammonia is not satisfactory in neutralizing a nickel solution when acid, as it frequently causes peeling. Add carbonate of nickel or bicarbonate of soda for the purpose, and when making additions to the bath add only the single sulphate of nickel and a small amount of sal ammoniac. We may state that rough deposits are due to a weak solution that is low in metal. Because your solution registers 6 Baume, does not prove that you have the correct proportion of metal in it. If it contained nothing but sulphate of ammonia due to the addition of ammonia in neutralizing the free acid constantly formed, it might register 6 Baume just the same. The Baume scale can be very misleading under some conditions.

PLATING

Q.—We are contemplating the installation of plating tanks to hold acid copper solutions and would like to know what kind of lining to put in the wood tanks, if any is necessary. Our solutions will run from 12½% to 25% acid, and will be in constant use?

A.—Plain wooden tanks can be used for acid copper tanks for a considerable length of time, providing they are well made and thoroughly bolted, and the inside and outside given a coat of hot coal tar asphaltum. Acid solutions have a tendency to rot wood, so all exposed surfaces should be well protected. The most substantial method to use is to line the tanks with sheet lead and have the seams burned in, not soft soldered. The lead should lap over the top of the tank and down the outside for two or three inches; then coat the outside with asphaltum. A wooden lining about twelve inches wide should be arranged around the tank for the anodes to rest against and prevent short circuiting with the lead lining. If a wood tank is used lined or unlined with asphaltum, of course, this extra lining would not be required. You mention using a bath of from 12½% to 25% free acid. If this bath is for regular depositing the results will not be satisfactory with so much free acid.—C. H. P.

Q.—Will you please give me the following information: (1) How can a cyanide brass solution be changed to a cold copper solution; (2) Can you explain what is the reason of pin holes or pitting on cycle work appearing when the deposit is finished?

A.—(1) To change your brass solution to one of copper it would be advisable first to reduce your solution one-third to one-half; then add concentrated solution of acetate of copper in cyanide of potassium until the color comes up to the coppery tone; then add two ounces of sodium bisulphite to each gallon. The brass solution removed should be saved and used to make additions to the bath as occasion requires it, using care not to add too much at one time causing too light a coppery tone.

(2) The pin holes are due to occluded hydrogen, which is caused when the solution is too low in metal or contains an excess of free acid. As a remedy add one ounce of single sulphate of nickel and two ounces of sal ammoniac to each gallon of solution.—C. H. P.

Q.—We are sending you three pieces of metal parts, which the parties who furnished claimed could be plated by the same methods used for brass and bronze. You can see the results we have obtained. Why do they turn a streaky black? Also, if possible, tell us the composition of which they are made and why on some of them the plate peels and crumples off?

A.—We presume these castings are pressure castings, made up from an alloy consisting largely of zinc with a percentage of aluminum and copper. This is the reason you cannot successfully nickelplate them in the regular nickel bath. Zinc will turn black when plated in a bath made up from the regular double nickel salts, even when previously coated with a deposit of brass or copper, unless a very strong current is used. Then the edges of such articles are liable to burn on account of too great an evolution of hydrogen in the deposit. If you wish to nickelplate such articles successfully the following formula will give you excellent results.

Nickel sulphate	10½ ozs.
Potassium citrate	7 ozs.
Chloride of ammonia (sal ammoniac)	10½ ozs.
Water	2½ gals.

If possible use rolled nickel anodes in preference to the cast article, as they give better results. The batch must be worked strictly neutral, therefore should be tested frequently with blue litmus paper. When acidity occurs add a small amount of sal ammoniac and potassium citrate. With a strong current, nickel can be deposited directly upon zinc without previously brass or copper plating the surface.—C. H. P.

Q.—Kindly publish formula for a good rich silver solution.

A.—A good rich silver solution should consist of the following:

Silver chloride	4 ozs.
Potassium cyanide	12 ozs.
Water	1 gal.

The chloride of silver is best prepared by taking the metallic silver, dissolving in nitric acid, evaporating until the solution becomes syrupy and all the excess of nitric acid has been driven off, then precipitate the silver as chloride by the addition of common salt. Allow the precipitate to settle and pour off the top of the solution. Wash the precipitate a number of times with clean water until the washings show no cloudiness when tested with silver nitrate solution.—C. H. P.

SOLDERING

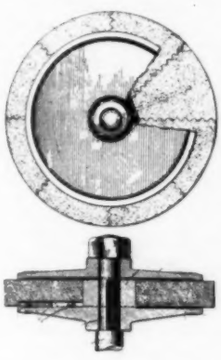
Q.—We have to solder a seam of a german silver tube which is ½ in. in diameter and 5 ins. long, and would like to know if you can give us a flux or the name of somebody that makes one which will work in the best possible way?

A.—The best material for soldering german silver tubes is silver solder, which as usually made consists of equal parts of coin silver and sheet yellow brass. Fused borax, finely powdered, is the flux generally used.—J. L. J.

PATENTS

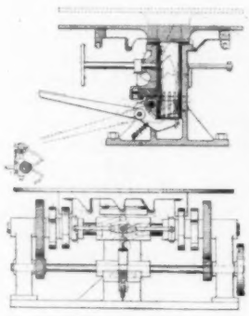
REVIEW OF CURRENT PATENTS OF INTEREST TO THE READERS OF THE METAL INDUSTRY.

984,961. February 21, 1911. METHOD OF PRODUCING AND OPERATING GRINDING-WHEELS. H. B. Nichols, Philadelphia, Pa. The principle involved in this invention is that of constantly feeding or advancing the material of the body toward the cutting line to compensate for wear.



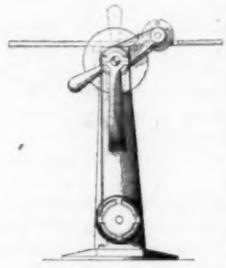
The patent covers a grinding wheel, shown in cut, of separate sections, which when the wheel is new are in immediate contact with each other, and are interlocked along radial lines, being held by clamping plates which can be opened for purposes of adjustment. After wear the separate blocks or sections of the wheel are adjusted by moving them out from the center, and the resulting radial interstices are filled with special interlocking bricks made for the purpose. After the several sections have become so worn as to be useless, the filling bricks, having parallel edges, although worn can still be employed for other wheels.

985,464. February 28, 1911. UNIVERSAL JOLT-RAMMING MACHINE FOR CORE-BOXES. T. F. Sisson, Providence, R. I., assignor to A. J. Miller, Providence, R. I. Machines for automatically ramming the sand for making molds have been made and are in use, such machines usually employing pneumatic mechanism for operating the table on which the boxes are placed, but such machines are expensive in structure and operation, and are not thoroughly effective for use with core boxes unless the latter are of the simplest nature. Therefore it is still the general practice to ram the sand in core boxes by hand.



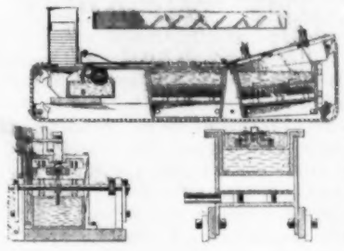
The object of the present invention is to provide a mechanically operated jolting or jarring machine as shown in cut which will efficiently ram the sand for the making of all kinds of cores.

985,272. February 28, 1911. METAL SAW AND TRIMMER. H. G. Miller, Milwaukee, Wis., assignor to Miller Saw Trimmer Company, Alma, Mich. This invention relates to a combined metal saw and trimmer and it is one of the objects of my invention to so arrange the trimmer that it may be moved with respect to the work-holding table in such a manner that when it is desired, the trimmer may be thrown to an idle or inoperative position where it will not interfere with the work done by the saw.



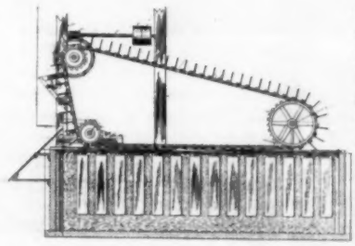
It will be observed that in view of the loose mounting of the hub on the shaft, the trimmer-mechanism will normally assume a vertical position due to gravity, as indicated in dotted lines in the cut. In this way the trimmer is normally in an idle or inoperative position, without leastwise interfering with the proper working of the saw. In case it is desired to use the trimmer, it is simply necessary to grasp the handle and move the entire trimmer-arrangement to the operative position, as shown in the full lines. If desired, suitable stops may be provided for limiting the upward movement of the trimmer-mechanism. In the operation of the machine, as soon as the metal plate or bar under treatment has passed beyond reach of the saw, it enters the field of action of the trimmer-knives, which trim it down to the required size or form. Upon releasing the handle, the entire trimmer-arrangement drops out of the way, ready to be moved into operative position at any moment.

985,151. February 28, 1911. TUBE-SOLDERING MACHINE. J. M. Fedders, Buffalo, N. Y., assignor to Theodore C. Fedders, Buffalo, N. Y. This invention relates to a machine which is more particularly designed for soldering the longitudinal seams of square tubes which are used in constructing radiators for cooling the water which is circulated around the cylinders and other parts of automobile engines. Heretofore this operation has been performed by hand and since radiators of this character require a very large number of such tubes in their construction and this soldering has to be perfect so as to effectually seal the seam or joint in the tubes this soldering operation formed a very considerable part of the expense in the production of radiators of this character.



The patent includes the following claim among others: A tube soldering machine comprising means for applying solder to the tubes, and means for removing the surplus solder from the tubes comprising a grooved stripping plate past which the outer solder coated surface of each tube is moved and means for holding the tubes against said stripping plate comprising a presser plate adapted to engage with the tube opposite to the solder coated side thereof, and springs for holding said presser plate yieldingly in engagement with the tube.

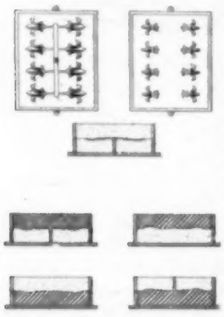
986,303. March 7, 1911. ELECTROPLATING MACHINE. C. G. Miller, Chicago, Ill., assignor to the Meaker Company, Chicago, Ill. Electroplating is usually a comparatively slow operation, but with the very great demand for such work owing to the enormous extension in the various arts of the use of plated articles, as, for instance, articles coated with zinc or nickel, it has become necessary to provide as nearly as possible a continuously operating machine whereby the articles may be carried progressively through a plating solution to be automatically discharged from the end of the machine. Such an invention should afford as nearly as possible a uniform coating of the articles treated, and it is therefore an object of this invention to provide a continuously operating electroplating machine as shown on cut of such construction as to enable the articles treated to be given a uniform coating in passing through the bath or electrolyte, and to automatically discharge the articles from the opposite end of the machine from which they entered. This machine was fully described in THE METAL INDUSTRY, January, 1911.



One of the principal claims of this patent is as follows: The combination with a narrow tank adapted to contain an electrolyte, of removable anodes electrically connected and supported in the electrolyte, outwardly directed supports movable longitudinally of the tank, each having an angularly directed extremity for supporting the articles to be plated, mechanism operated by the carrier for engaging the coated articles, a spring for actuating the mechanism for discharging the coated articles

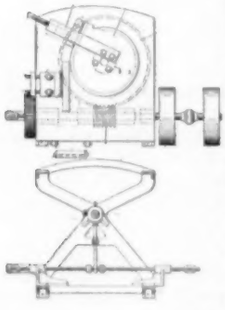
from the angular extremities of the supports and means for directing the articles plated from the tank.

985,967. March 7, 1911. PATTERN-PLATE. John Bayer, Cleveland, Ohio. The invention relates to pattern plates for use in making molds for the casting of metal, by the use of which pattern plates sand molds may be easily and quickly obtained without the necessity of splitting the flask and withdrawing the pattern, which latter operation is frequently attended with accidents which destroy the sand mold and require its being made over again. By the pattern plates here shown, the cope and drag of a mold may be quickly made by ramming sand into contract with the pattern plate when held in a suitable flask.

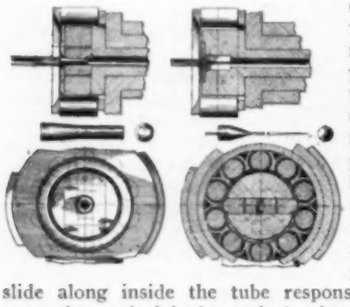


Furthermore, the invention defines a pattern plate or plates made of a composition of such characteristics that the substance does not shrink on cooling, when the pattern plate is first made from the original pattern. The composition of the pattern plate is substantially as follows: Trinidad asphalt 73 parts, plumbago 2 parts, plaster of Paris 25 parts.

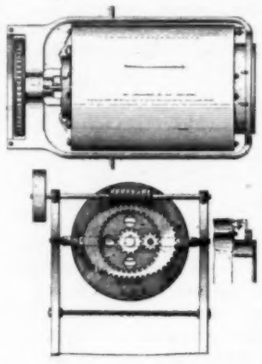
986,654. March 14, 1911. TUBE BENDING MACHINE. Radu Tattu, New York, N. Y. The machine shown in cut is designed for the bending of tubes and is operated as follows: A core upon the core holder is inserted in the tube to be operated upon, and the tube is passed between a plate, which is preferably grooved on its face to receive the tube, and the rotating member, the tube being clamped against the rotating member by a bolt located in the downwardly bent end section of the clamping member. Power is then applied by a belt upon the driving pulley to the worm which is caused to rotate, thereby rotating the gear wheel which it engages. The rotating member upon the upper end of the hub upon which the gear is set is thus caused to rotate and the end of the tube to be operated upon is drawn around the rotating member, giving the tube the desired bend. A plate moving upon the guide member with the tube serves to prevent the abrasion of the surface of the tube which is being bent. The core within the tube will serve to prevent the collapse of the tube. When the tube has, in the manner indicated, received the desired bend, power in transferred to the driving pulley whereby the parts are restored to their normal condition, and, if desired, this may be again repeated and a further bend given to the tube.



987,093. March 14, 1911. METHOD OF PRODUCING THIN HARD TUBES FROM DUCTILE METAL. J. E. Wilson, Los Angeles, Cal. This patent covers a method for producing hard thin tubes from a ductile metal such as gold, etc. By means of the device shown in cut the process is carried out as follows: Into the end of a tube of ductile metal is introduced a free plug circular in cross-section provided with a frusto-conical body and with a slightly tapering stake, that projects from, and is of less diameter than the tip of said body, and then the tube is swaged upon said body and stake at the same time permitting the free plug to slide along inside the tube responsive to the swaging action upon the conical body, and simultaneously therewith causing a sufficient resistance to be exerted against the progress of the plug to allow swaging to be effected.



986,823. March 14, 1911. ELECTROPLATING MACHINE. J. W. Heaphy, Philadelphia, Pa. This invention consists of a novel construction of an electroplating machine, shown in cut, wherein a very strong current of electricity may be employed and a tough and thick disposition of material rapidly produced, and the deposit is uniform over the entire surface, so that the depression and high lights are evenly covered.

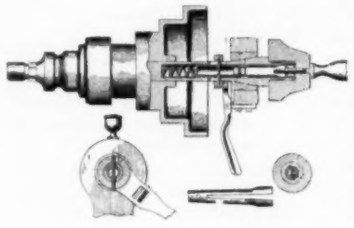


It further consists of a novel electroplating machine in which the container is kept constantly in motion to insure the active chemical condition of the fluid, a large anode surface being provided and provision being made for constantly changing the position of the article being plated whereby the hydrogen bubbles which form on the work are dislodged and the operator is enabled to prevent the pulverulent granulated deposit and bluish luster and the work will remain bright and readily respond to the buffing operation.

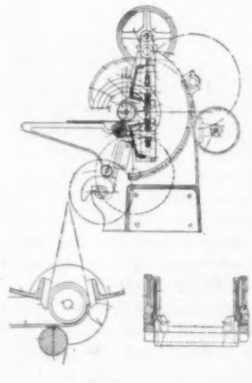
It further consists of a novel construction of cylinder and rack, novel means for operating the same and novel means for actuating the rack and for electrifying the solution.

987,405. March 21, 1911. METAL SPINNING LATHE. Fritz A. Schulz, Chicago, Ill. This invention relates to a novel construction in a metal spinning lathe of the type shown in cut and used for doing what is known as center-punching spinning, and has for its object to provide means for enabling work to be quickly removed and replaced, thus effecting a great saving of time and labor, and consists in the features of construction and combinations of parts described in the following claim:

1. A chuck comprising a hollow spindle, a sleeve movable longitudinally within the same and having a flaring mouth, a member split at one end and enlarged to form separable jaws adapted to fit said flaring mouth of said sleeve and be forced together thereby, said sleeve being provided with a longitudinal slot, a pin in said split member entering said slot, a pin in said sleeve passing through a longitudinal slot in said spindle, a collar longitudinally movable on said spindle and receiving the ends of said pin in said sleeve, a spring for normally holding said sleeve at the forward limit of its movement, a stop disposed in the path of said split member, and a lever engaging said collar for moving said sleeve against the action of said spring. This machine was described in THE METAL INDUSTRY, February, 1911.



987,598. March 21, 1911. TUBE-ROLLING MACHINE. Otto Pfrengle, Stuttgart, Germany. This invention relates to machines for bending metal plates cold, and it is directed to that well-known class comprising a plurality of practically independent organisms or elements—in other words a series of separate small machines—which are secured end-to-end and combined with a mandrel and with operating mechanism, both common to each organism or element, thus constituting one long machine capable of being extended or reduced lengthwise to accommodate long or short plates.



The object of the invention is to produce long tubes of comparatively small diameter that will be of true shape throughout and therefore ready, when removed from the machine, to be welded, soldered, riveted or otherwise dealt with.

INDUSTRIAL

NEW AND USEFUL DEVICES, MACHINERY AND SUPPLIES OF INTEREST TO THE READERS OF THE METAL INDUSTRY.

BAKELITE LACQUER

There was placed on the market in October, 1910, a material called Bakelite lacquer by the General Bakelite Company, New York. This material is a specially prepared varnish for the lacquering of metallic objects. "Bakelite" is a new discovery and is a well-defined chemical substance of specific properties. It is the invention of Dr. L. H. Bakeland, the well known inventor of gas light photographic papers of which Velox is perhaps the best known.

Bakelite is a synthetic product resulting from the reaction of carbolic acid and formaldehyde and is a transparent amber-like solid without either odor or taste. It is called "Bakelite" as a simpler trade-mark in place of the somewhat longer and more puzzling chemical name of oxybenzylmethylenglycoanhydride. Bakelite is produced in three forms called A, B and C, or liquid, pasty and solid, and all three forms are produced by the application of heat.

Bakelite lacquer is the A condition diluted with amyl and wood alcohol, it dries somewhat more slowly than ordinary Bakelite varnish and gives a much thinner coat. Spontaneous drying should be followed by the gradual application of high temperature, 266 degs. Fahr. (130 degs. Cent.) or over, until the final state C is obtained, which can be ascertained by the fact that it withstands scratching with the finger nail and is not attacked by acetone. In a bakelizer (an apparatus for baking under pressure) the whole operation can be finished in less than one hour. This lacquer is transparent, and its color can be made to vary from a slight yellowish tint to a deep brown.

When the stage C is reached the lacquered coat cannot be removed, so that if it is desired to use the lacquer on objects such as chafing dishes, etc., where the lacquer is taken off before use: it is advisable not to heat these lacquered objects and then the Bakelite can be removed with amyl or wood alcohol. It lacks the unusual great flexibility of nitrocellulose—and celluloid-lacquer; on the other hand, it resists temperatures considerably higher than those at which nitrocellulose is completely destroyed. It furthermore withstands solvents, which quickly attack other lacquers.

Bakelite lacquer can be brought to a very pleasing golden color. Darker tints may be obtained by longer or stronger heating. These colors do not bleach out as is the case with nitrocellulose lacquers or resinous lacquers, which simply have been colored by means of aniline dyes.

Bakelite is also the basis of several grades of protective enamels which can be applied either by brushing on, dipping, or spraying as in the case of the lacquer. These enamels are intended to serve as a protection for metallic surfaces, pipes and machinery against corrosive influences. The enamel compositions vary according to the special uses for which they are intended. They all contain bakelite in condition A, or soluble state and after they have been applied to the surface, which they are intended to protect they should be hardened by a gradual application of heat. If the coat of protective enamel is not too thick, then a simple, gradual heating in a stove will answer the purpose, although here again better and quicker results can be obtained by the use of a bakelizer, in which case the whole process can be shortened to less than one hour. Oxidized, rusty or greasy metallic surfaces prevent proper adherence. Therefore it may become necessary to clean or sand-blast the object which has to be coated; in certain cases, a preliminary pickling in acid may remove the rust.

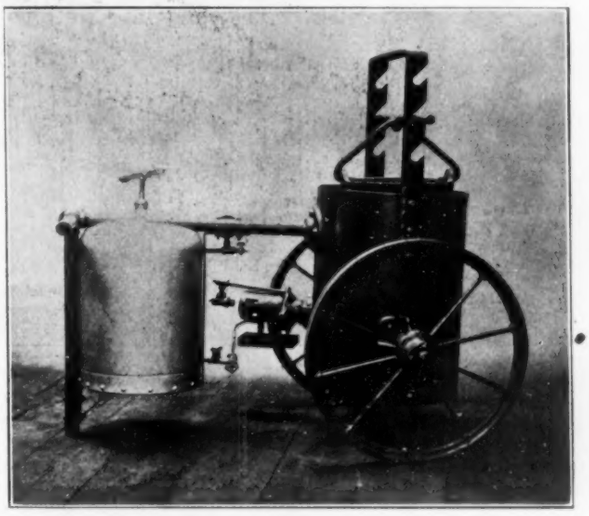
Bakelite C has a very good luster, and, besides its more important technical applications, is very suitable for jewelry and fancy goods on account of its durability, strength and pleasing appearance. In some of its forms it is more transparent than amber, and decidedly stronger. C withstands alcohol and other solvents, which ordinarily attack celluloid, rubber or amber. It also resists steam, boiling water and almost all chemicals; for instance hydrochloric acid, chlorine, ozone, cold sulphuric acid and boiling dilute sulphuric acid; but it is rapidly attacked by boiling concentrated sulphuric acid, nitric acid and bromine. Certain varieties can be made to withstand warm caustic soda solutions.

Full information regarding Bakelite in all its forms is given in a booklet "Information No. 1," obtained upon request, from The General Bakelite Company, 98 William street, New York.

OIL BURNING APPLIANCES

A furnace for the melting of soft metals has just been perfected by the Hauck Manufacturing Company, manufacturers of "Hauck" kerosene torches and oil-burning appliances, Brooklyn, N. Y. This furnace, as shown in the cut, consists of a shell, either mounted on wheels or on legs, and a cast iron melting pot suspended from a bar. There is also an oil storage tank in connection with the outfit, properly connected with the furnace shell by pipe. To the furnace shell is attached one of the "Hauck" patented burners, either of the independent self-contained style or compressed air type.

The Hauck Company state that this burner gives complete combustion and the clean flame is led into the furnace shell, which is so arranged that the flame is evenly distributed, giving the necessary heat, and the metal is melted all together. This heat can be regulated to suit conditions. The furnace elimi-



HAUCK SOFT METAL MELTING PORTABLE FURNACE.

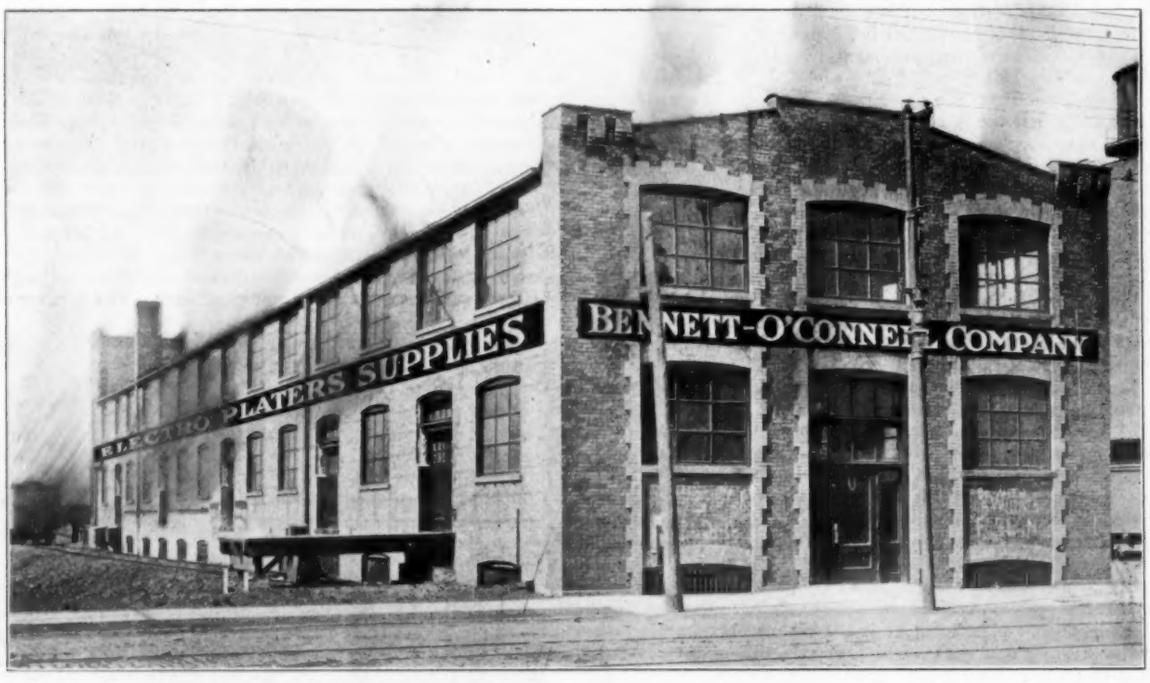
nates entirely all the smoke nuisance, and as it is compact in construction, is very easily portable from one place to another. Due to the practical construction of the patented burners attached to the furnaces, it is claimed, they consume very little fuel, therefore, are most economical in operation.

The same company manufacture the "Hauck" patented kerosene torch. It is said that this torch is something entirely new and is designed to take place of the dangerous gasoline torches. At the same time, it will do the work of three or four gasoline torches, giving much more powerful, larger and cleaner flame, and is also very economical in operation, consuming very little kerosene, and, of course, eliminates entirely all danger of fire or explosion. They are simple in design and very strongly built to stand rough usage. These torches have solved the problem to use kerosene with better results than gasoline. They are adaptable for various heating operations, light brazing, tinning, producing an intense clear flame, etc.

The torch is built in three sizes from ½ to 10 gallons in capacity. The flame of No. 14 torch will melt a piece of copper one-half by one-quarter inch in three minutes and a one-inch brass rod in two minutes. Special catalogues upon request

PLATERS SUPPLY BUILDING

The accompanying picture gives a specially good view of the new home of the Bennett-O'Connell Company, Chicago, Ill., to which the firm is now moving, though for some time in the future the offices will be continued at the present home, and for a while some stock will also be carried there. The new plant and warehouse was formerly an automobile factory, and is specially equipped for the purpose to which the new firm will put it. It is situated at Morgan and 36th streets, on the Junction Railroad, from which they will have access to all of the thirty-seven railroads entering Chicago. Goods will be shipped in and out without any switching charges, which will mean a big saving. Considerable of the business of this firm is car load work, and this will save all the teaming heretofore necessary. All outgoing and incoming goods in less than car loads will also be handled without any switching charges.



BENNETT-O'CONNELL COMPANY'S NEW BUILDING, CHICAGO, ILL.

The building is 50 feet wide and 227 feet long, three stories, and will give them a floor space of some 38,500 square feet. It is equipped with an immense elevator, and goods can be taken from the cars either to the elevator or through a chute to the basement. A railroad track extends along all of one side, which gives them space for loading or unloading from eight cars at one time. The plant has been equipped with all the latest devices in the shape of new machinery and motor drives for the composition department, where they can turn out their well-known Mascot brands of buffing and polishing compositions much more cheaply than heretofore. This will be the largest factory in the United States for this class of work.

The firm manufactures and handles everything in the line of buffing and polishing lathes—belt driven—electroplating dynamos, and plating room equipment. These lines will be added to considerably. The stocks carried will naturally be much greater than heretofore. They will also add more of the heavy chemicals.

This firm has built up a very large business in these lines in the sixteen years it has been in existence, and has always been in their old neighborhood, that is close to their present address, 17 South Clinton street. The success of the firm has been due to the ability and hustle of Martin J. O'Connell, president, and Charles D. Bennett, general manager of the firm.

This firm has a Cleveland, Ohio, office, with warehouse on the railroad where a full line of the company's goods are carried.

HARDENED COPPER

A metal that is now being manufactured, and which is likened to Egyptian bronze, is known as "Hardened Copper." This metal, which has approximately the same composition that analysis has shown constituted the bronzes of ancient times, is being used for the manufacture of many articles where a hard, smooth, non-corrosive surface is required.

It is used for journal bearings and all frictional parts, in machines or machinery of all kinds, in many instances being able to replace highly-tempered or case-hardened steel, as for instance, in use as locomotive link blocks and links. Electrical appliances, for trolley wheels, commutator sections, spark jlugs and all elevator work. Automobile work, for all bushings, bearings and other frictional parts, proving vastly superior to anything now in use. Marine use, for all frictional exposures, especialy when in contact with salt water, being non-corrosive. Also for engraving plates and all keen-edged instruments, including surgical and dental instruments, as the metal is not affected by bichloride of mercury.

Hardened Copper, as furnished in ingot form, has a tensile strength of 37,500 lbs. per square inch, and is claimed not to be affected by remelting, so that the original ingot can be remelted and cast into castings and still have the initial properties.

In making the metal in the first instance there is no loss by oxidization, as there is no slag to remove from the molten metal, nor fumes indicating oxidization in any perceptible degree. The remelting is done in practically the same manner as brass or bronze of ordinary mixtures, and by ordinary foundry practice. The working of the metal must be done with considerable care, as it cannot be forged at all, and if rolled or drawn, must have frequent annealing. This remarkable metal is being manufactured by the Dawson Hardened Copper Company, 123 Liberty street, New York, who will be glad to give further information and to show samples.

STEREO PYROMETER

A new instrument for ascertaining the temperature of muffle, and crucible furnaces, gas retorts, pottery kilns and glass furnaces, etc., has lately been put upon the market by W. and J. George, Ltd., Birmingham, England. The appliance is a pyrometer known as the stereo and will indicate temperatures from 550 degs. to 2,000 degs. Cent. or from 1,000 to 3,600 degs. Fahr. The pyrometer shown in cut consists essentially of small glass cells containing dyes; the absorptive powers of which are so chosen that all the light of whatever color emitted by a hot body is absorbed. If the temperature of the body were raised, that cell would not

THE STEREO PYROMETER.

absorb all the light; some would be transmitted and the body would appear visible.

Some of the advantages claimed for the pyrometer which is used like a stereoscope are:

(1). The stereoscopic form enables both eyes to be used. Skilled observers agree that in using an optical instrument, one can make oneself see anything with one eye closed. For reliable observations the simultaneous use of both eyes is most desirable and in some cases essential.

(2). No accessory instrument is required as in the case of electrical pyrometers and the radiation pyrometer. This not only ensures simplicity but greater reliability and fewer corrections to be made.

(3). The stereo pyrometer is a zero and not a comparison

USING THE STEREO PYROMETER FOR TESTING ANNEALING TEMPERATURE.

instrument; the point observed is when the object just disappears from view. No standard tints or constant illuminants are required as in the case of the absorption or optical pyrometer.

(4). The whole of the instrument is used right away from the hot body, so no part of it suffers from the chemical changes, disintegration and depreciation which all bodies experience at high temperature. It can be used at any convenient distance from the hot object, so long as the intervening space is comparatively free from smoke, etc. The area of the object in question diminishes according to the square of the distance, the illumination at the pyrometer due to the hot object also varies inversely at the square of the distance. Its brightness therefore remains constant.

(5). The stereo pyrometer can be used for all articles of all sizes; the readings being just as accurate for small as for large things. This is not the case with many other pyrometers, e. g., the Féry Radiation pyrometer.

(6). The stereo pyrometer has the great advantage that an observation can be made instantly.

(7). No Nicol prisms are used, nor does the stereo pyrometer depend on the properties of polarized light, so no errors arise owing to the light emitted from a hot body being practically polarized.

(8). The stereo pyrometer in common with other optical pyrometers can be used to observe the very highest temperatures obtainable.

The cost of the stereo pyrometer is very low being 39s. 6d. ($9.48) complete with 4 cells in case and additional standard cells in sets of four cost 15s. Circulars upon request.

BRAZING MACHINE

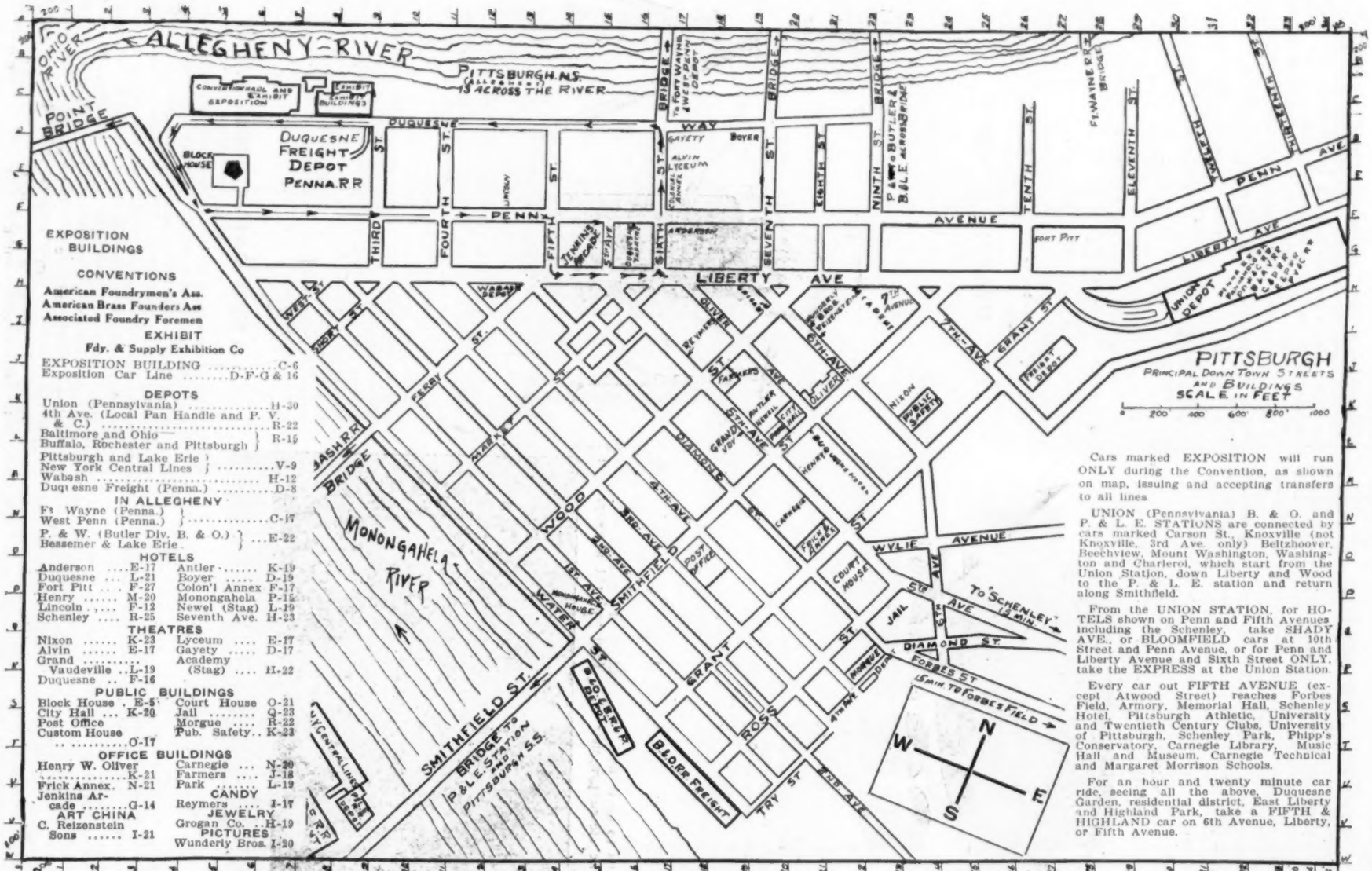
The brazing machine shown in cut has been lately placed upon the market by the Clayton & Lambert Manufacturing Company, makers of gasoline fire-pots and torches, of Detroit, Mich. The machine has a patented coil burner that produces an intensely hot blue flame about 2 in. in diameter. The handle

CLAYTON & LAMBERT BRAZING MACHINE.

connected to the burner, as indicated in the illustration, makes it convenient for holding the flame in any position desired. The tripod is made adjustable so the burner may be raised or lowered. The burner is connected to a 10 gal. pressure tank by 6 ft. of flexible copper hose. The tank is equipped with air valve, supply valve, filler plug and 100-lb. pressure gauge. The company supplies a patented compound pressure pump to enable the operator to secure the pressure required quickly. In addition to this brazing apparatus, the company manufactures a complete line of fire-pots and torches. Literature on the brazing machine, which is known as No. 100, may be had for the asking.

A NEW GALVANIZING SALT

Zinc ammonium chloride, a new galvanizing salt, has been placed on the market by A. Klipstein & Company, 129 Pearl street, New York. Zinc ammonium chloride is a double salt having the formula $Zn\,Cl_2\,NH_4\,Cl$ and containing 44 per cent. ammonium chloride and 56 per cent. zinc chloride. This salt it is claimed effects a great saving, as it takes the place of ammonium chloride (sal ammoniac) alone. Its action, as described by the above mentioned company, is to set up at once a galvanic action without the necessity of waiting for the sal ammoniac to attack the zinc, as in the ordinary solution, and form this salt. According to those who have used it, very satisfactory results have been obtained.



EXPOSITION BUILDINGS

CONVENTIONS

American Foundrymen's Ass.
American Brass Founders Ass
Associated Foundry Foremen

EXHIBIT

Fdy. & Supply Exhibition Co

EXPOSITION BUILDING C-6
Exposition Car Line .....D-F-G & 16

DEPOTS

Union (Pennsylvania) H-30
4th Ave. (Local Pan Handle and P. V. & C.) R-22
Baltimore and Ohio } R-15
Buffalo, Rochester and Pittsburgh }
Pittsburgh and Lake Erie }
New York Central Lines } V-9
Wabash H-12
Duquesne Freight (Penna.) D-8

IN ALLEGHENY

Ft Wayne (Penna.) }
West Penn (Penna.) } C-17
P. & W. (Butler Div. B. & O.) } ...E-22
Bessemer & Lake Erie }

HOTELS

Anderson	E-17	Antler	K-19
Duquesne	L-21	Boyer	D-19
Fort Pitt	F-27	Colon'l Annex	F-17
Henry	M-20	Monongahela	P-15
Lincoln	F-12	Newel (Stag)	L-19
Schenley	R-25	Seventh Ave.	H-23

THEATRES

Nixon	K-23	Lyceum	E-17
Alvin	E-17	Gayety	D-17
Grand Vaudeville	L-19	Academy (Stag)	H-22
Duquesne	F-16		

PUBLIC BUILDINGS

Block House	E-5	Court House	O-21
City Hall	K-20	Jail	Q-23
Post Office		Morgue	R-22
Custom House	O-17	Pub. Safety	K-23

OFFICE BUILDINGS

Henry W. Oliver	K-21	Carnegie	N-20
Frick Annex.	N-21	Farmers	J-18
Jenkins Arcade	G-14	Park	L-19

ART CHINA

C. Reizenstein Sons I-21

CANDY

Reymers I-17

JEWELRY

Grogan Co. ..H-19

PICTURES

Wunderly Bros. I-20

Cars marked EXPOSITION will run ONLY during the Convention, as shown on map, issuing and accepting transfers to all lines

UNION (Pennsylvania) B. & O. and P. & L. E. STATIONS are connected by cars marked Carson St., Knoxville (not Knoxville, 3rd Ave. only) Beltzhoover, Beechview, Mount Washington, Washington and Charleroi, which start from the Union Station, down Liberty and Wood to the P. & L. E. station and return along Smithfield.

From the UNION STATION, for HOTELS shown on Penn and Fifth Avenues including the Schenley, take SHADY AVE., or BLOOMFIELD cars at 10th Street and Penn Avenue, or for Penn and Liberty Avenue and Sixth Street ONLY, take the EXPRESS at the Union Station.

Every car out FIFTH AVENUE (except Atwood Street) reaches Forbes Field, Armory, Memorial Hall, Schenley Hotel, Pittsburgh Athletic, University and Twentieth Century Clubs, University of Pittsburgh, Schenley Park, Phipp's Conservatory, Carnegie Library, Music Hall and Museum, Carnegie Technical and Margaret Morrison Schools.

For an hour and twenty minute car ride, seeing all the above, Duquesne Garden, residential district, East Liberty and Highland Park, take a FIFTH & HIGHLAND car on 6th Avenue, Liberty, or Fifth Avenue.

MAP OF PITTSBURG, PA., SHOWING LOCATION OF DEPOTS, HOTELS, AND EXHIBITION GROUNDS WHERE THE ALLIED FOUNDRYMEN ASSOCIATIONS AND MECHANICAL ENGINEERS WILL HOLD THEIR CONVENTIONS, MAY 22—JUNE 1, 1911.

Associations and Societies

DIRECTORY OF AND REPORTS OF THE PROCEEDINGS OF THE METAL TRADES ORGANIZATIONS.

PITTSBURG CONVENTION OF FOUNDRYMEN AND MANUFACTURERS

A Description of the Plans Being Made for the Holding of the Annual Meeting of the Allied Foundrymen's Association.

In little more than a month from now, the annual convention of the American Foundrymen's Association, the American Brass Founders' Association and the Associated Foundry Foremen will gather in Pittsburg for four days' sessions, commencing May 23 and ending May 26. Information in the hands of the committee in charge of the convention indicate that more than 3,000 delegates will attend these meetings. At the same time, the great exhibit of the Foundry and Machine Exhibition Company will be held, and this latter feature will be the most extensive ever given in the history of these conventions. More than 40,000 square feet of space has been taken for these exhibits, greater in area than Madison Square Garden in New York, and the character of the exhibits will be not only unique but remarkable in their completeness.

For some months the local committee of foundrymen have been working for this convention. The securing of the buildings of the Western Pennsylvania Exhibition Society, at the junction of the Allegheny, Monongahela and Ohio rivers, insured at the outset abundant room. In fact the committee is informed that the space for use is greater than at any other convention and what is better still, the convention sessions and exhibit will be under practically one roof. The Pittsburg committee in charge of the work of preparation for the convention consists of Joseph T. Speer, chairman; F. W. Zimmers, secretary; J. S. Seaman, chairman of the finance committee; H. E. Field, chairman of the convention committee; W. A. Bole, chairman of the Plant Visitation Committee; George P. Bassett, Jr., chairman of the Ladies' Entertainment Committee; E. D. Frohman, chairman of the Ball Game Committee; Eliot A. Kebler, chairman of the Reception Committee, and W. B. Robinson, Press Committee.

This general committee has labored diligently. The last week in March it was able to issue the first official programme of the convention, which were sent broadcast, in order that the information contained could reach the thousands of delegates in advance. The programme is in the form of a neat folder, and contains a map of the business section of Pittsburg, making the location of all railroad stations, hotels, exposition buildings, bridges, and showing the river formation in the city. A comprehensive table is also printed giving the names of all first class hotels with the rates of each where these special rates could be secured. Advice is given, too, to arrange early for accommodations as the hotels will be well filled during the convention.

On the map of the business district there is a directory showing the location of theatres, and car lines in every direction, with detailed explanations regarding them. There is also information of the best car rides to take for sight seeing. Notice is given of the exposition of foundry and machine appliances, which states that a season admission ticket will be issued for $1, with single admission tickets of 25 cents. Not only will this exhibit take up two massive buildings but a special building will be built along the river levee connected with the main buildings, where furnaces will be operated and the most up-to-date equipment will be shown in actual operation.

On Monday, May 22, registration of delegates will begin at the exposition buildings. On Tuesday, the formal opening will take place and at the joint meeting papers on "Production Cost"; "Economic Foundry Insurance" and "Uniform Contracts" will be presented. The names of the authors have not yet been given. In the afternoon of the same day there will be sessions of the Foundrymen's Association and the American Brass Founders' Association and in the evening, the exposition will be opened for the delegates. Paper have been announced for each of these afternoon sessions of special interest.

On Wednesday, May 24, the morning session will be a joint gathering and in the afternoon the Brass Founders will meet and the American Foundry Association will hold a meeting separately. At the same time, there will be specially arranged trips for those who wish to take the time over the plants of the Pittsburg district under the direction of committees appointed for this purpose. At 6:30 o'clock in the evening will be the dinner of the Pittsburg and Associated Foundry Foremen at a place to be announced later.

On Thursday morning, May 25, the joint session will be held and papers of general interest will be presented. In the afternoon a special train will start from the Union station of the Pennsylvania railroad which will take the visitors over the great Pittsburg industrial district, including foundries and steel works, mills and furnaces and in the evening there will be the annual entertainment to the delegates by the Exhibition Association, in the exhibit hall. On Friday morning there will be separate sessions of the associations and election of officers. In the afternoon there will be a grand move to the ball game between the Pittsburg and Cincinnati clubs of the National League, in Forbes Field, which, by the way, is supposed to be the most costly and substantial athletic field in the country, having been built at a cost of over a million dollars.

Friday evening will be the great banquet which the official programme calls the subscription dinner and which is open to all the delegates to the conventions. This is expected to be a notable event and speakers of prominence are expected. On Saturday the exhibition will be open and as there are no sessions, the delegates can give their entire time to this feature. In this connection it is claimed by the officers of the Exhibition Company that it will be the largest ever given. One statement made is that the value of the exhibits alone will run over a million dollars and at no time has there been so much effort to have equipment in actual operation and doing work as at this time.

But aside from the formal features of this convention, there will be some unusual attractions for visiting foundrymen to Pittsburg. The home of the steel industry and of the coke and coal supply of a vast portion of the country, has a thousand points of interest in which the foundryman is personally and directly interested. Besides this, the city is something of a surprise to the stranger with hearsay tales in his mind of the community. Its great art and museum and library structures, representing one of the most costly piles for this purpose in the world; its universities, and technical schools, where embryo foundrymen are seen at work in model foundries and in pattern shops, as well as students of a score of other industries present is out of the ordinary for the visitor to see. There are the extensive library systems, conservatories and observatories of international fame and beyond all the United States Bureau of Mines station and testing laboratory of the Geological Survey where every form of materials are tested, coals analyzed fire clays, steel, iron and castings are brought into a scientific limelight which can be visited. In fact, days could be profitably spent in this one institution by foundrymen and steel makers.

Taking in the exhibit of Pittsburg itself, will require more time than most foundrymen can possible give, and this added to the special exhibit for them, promises to make the occasion an unusual one for the visitors. It is promising to make the Pittsburg convention the biggest that has been held, and Pittsburg Foundrymen's Association is undertaking the work with enthusiasm and confidence in the outcome.

During the past few days interest has been aroused over the early efforts being made to secure the convention for 1912. The most active of these thus far have come from the foundrymen of Buffalo, N. Y., and they have enlisted the aid of the Chamber of Commerce of that city in their behalf. A special train has been chartered to bring the Buffalo foundrymen to Pittsburg and members of the Chamber of Commerce of that city will accompany them, and will do considerable "rooting" for the lake city during the session here. Other cities are expected to be heard from before the opening of the convention and the contest promises to be quite a lively one. Another feature of special interest in connection with the event is the fact that directly following the convention, there will be the meeting of the American Society of Mechanical Engineers in Pittsburg, which will bring many hundreds of this profession to the city. Because of this fact the exhibition of foundry furnaces and equipment is to be kept open for a second week, and thus give the engineers a chance to see it in complete form.

The Pittsburg Foundrymen's Association, which has been working for the success of the coming convention is a strong compact body of foundrymen, with a serious view of the association work and a record for team work that is little short of remarkable. The monthly meetings and dinners of the association are noted for the discussion of the technical side of foundry practice and are entered into with great enthusiasm and earnestness. When the task of preparing for this great convention came to this association, it fell on sturdy shoulders and the systematic and business-like methods of procedure have resulted in every detail being looked after thoroughly. The entertainment features for the ladies of the party have been most generous and elaborate and they will be well occupied during their stay in the city and will be shown a side of Pittsburg life that is little heard of. Its miles and miles of palatial homes with private parks; its philanthropic institutions and women's schools and colleges, with probably the most unique school for women in the world to be seen in the Margaret Morrison Carnegie School for Women, where every form of the domestic arts is taught as well as the special trades and crafts with which women are more adept than men. Social functions, theatre parties and automobile rides have been provided as well.

The preliminary programme is as follows:

(All at EXPOSITION BUILDINGS, unless otherwise stated.)

MONDAY, May 22—2 P. M.—Registration only.

TUESDAY, May 23—9 A. M.—Registration.

10 A. M.—*Joint Session*—Addresses of Welcome—Papers on:

- Production Cost
- Economic Foundry Insurance
- Uniform Contracts, etc.

2 P. M.—*Separate Sessions.*

A. F. A.—Papers on:

- Unloading Methods
- Use of Borings in Cupolas
- Effect of Alloys in Cast Iron
- Permanent Molds, etc.

A. B. F. A.—Papers on:

- Vanadium in Non-ferrous Alloys
- Determination of Nickel in Bronzes
- Pouring High Grade Bronzes, etc.

7 P. M.—*F. & M. E. Co.—Exhibit*—Open throughout the week during the day, and Saturday evening, May 27th.

WEDNESDAY, May 24—9:30 A. M.—*Joint Session*—Papers on:

- Rotary Blowers
- Foundry Construction
- Heating and Lighting Systems
- Pattern Making
- Molding Machines, etc.

2 P. M.—*A. F. A. Steel Session*—Papers on:

- Acid and Basic Open Hearth Processes
- Electric and Converter Furnaces for Steel Castings
- Effect of Vanadium and Titanium on Steel

2 P. M.—*A. B. F. A. Session*—Papers on:

- Corrosion of Brass Foundry Products
- Pyrometer and the Aluminum Foundry
- Non-ferrous Foundry Economies
- Equilibrium Diagrams, etc.

2 P. M.—Individual Plant Visitation.

6:30 P. M.—*Dinner*—Pittsburg and Associated Foundry Foremen. (Will announce place later.)

THURSDAY, May 25.—*Joint Session.*

9:30 A. M.—Papers on:

- Molding Sand
- Use of Alloys
- Shot in Castings, etc.

1. P. M.—*Train Excursion* to Foundries and Steel Works (Pennsylvania—Union Station).

8 P. M.—*Entertainment* by Foundry & Machine Exhibition Co. to Members of all Associations and their guests attending the Conventions.

FRIDAY, May 26—*Separate Session.*

9:30 A. M.—Election of Officers and reading of papers.

3:30 P. M.—Pittsburg and Cincinnati *Ball Game* at the Million Dollar Forbes Field.

6:30 P. M.—*Subscription Dinner* open to all who attend the Convention or Exhibition. (Will announce place later.)

SATURDAY, May 27—*The Exhibition* of the Foundry & Machine Exhibition Company will be open throughout the day and evening.

LIST OF EXHIBITORS:

Adams Co., Dubuque, Iowa.
Albany Sand & Supply Co., Albany, N. Y.
American Vanadium Co., Frick Bldg., Pittsburg, Pa.
Arcade Manufacturing Co., Freeport, Ill.
Bartley Crucible Co., J., Trenton, N. J.
Birkenstein & Sons, S., 337 Ontario street, Chicago, Ill.
Berkshire Manufacturing Co., Cleveland, Ohio.
Brown Specialty Machine Co., Jackson blvd. and Clinton st., Chicago, Ill.
Buch's Sons, A., Elizabethtown, Pa.
Buckeye Products Co., Cincinnati, Ohio.
Burroughs Adding Machine Co., Detroit, Mich.
Canadian Foundryman, Toronto, Ont.
Carborundum Co., Niagara Falls, N. Y.
Chicago Pneumatic Tool Co., Fisher Bldg., Chicago, Ill.
Cleveland Pneumatic Tool Co., 6410 Hawthorne avenue, Cleveland, Ohio.
Detroit Core Machine Co., Detroit, Mich.
Detroit Foundry Supply Co., Detroit, Mich.
Detroit Hoist & Mach. Co., Detroit, Mich.
Dixon Crucible Co., Jos., Monadnock Bldg., Chicago, Ill.
Elmira Foundry Co., Elmira, N. Y.
Gardner Machine Co., Beloit, Wis.
Gardner Printing Co., Cleveland, Ohio.
Goldschmidt Thermit Co., 90 West street, New York City, N. Y.
Hanna Eng. Works, 2059 Elston avenue, Chicago, Ill.
Harbison-Walker Refractories Co., Pittsburg, Pa.
Hauck Manufacturing Co., New York City, N. Y.
Hawley Down Draft Furnace Co., 736 W. Monroe street, Chicago, Ill.
Herman Pneumatic Mach. Co., Zelienople, Pa.
Hills & Griffith, Cincinnati, Ohio.
Ingersoll-Rand Co., 11 Broadway, New York, N. Y.
International Molding Mach. Co., Chicago, Ill.
Interstate Sand Co., Zanesville, Ohio.
Killing's Molding Machine Works, E., Davenport, Iowa.
Lawlor Improved Jarring Molding Mach. Co., 950 Century Bldg., Pittsburg, Pa.
Lupton's Sons Co., David, Philadelphia, Pa.
McCormick Co., J. S., Pittsburg, Pa.
Metal Industry, The, 99 John street, New York, N. Y.
Morner & Smith, 10 N. Canal street, Dayton, Ohio.
Mumford Molding Mach. Co., Plainfield, N. J.
National Core Oil Co., 57 Alabama street, Buffalo, N. Y.
Obermayer Co., S., Cincinnati, Ohio.
Ohio Sand Co., Conneaut, Ohio.
Oliver Machinery Co., Grand Rapids, Mich.
Osborn Manufacturing Co., Cleveland, Ohio.
Paxson Co., J. W., Philadelphia, Pa.
Penton Publishing Co., Cleveland, Ohio.
Peterson Co., T. J., Security Bldg., Chicago, Ill.
Pickands, Brown & Co., Commercial National Bank Bldg., Chicago, Ill.
Pridmore, Henry E., 19th and Rockwell streets, Chicago, Ill.
Robinson Auto, Mach. Co., Detroit, Mich.
Rockwell Furnace Co., 26 Cortlandt street, New York, N. Y.
Ross-Tacony Crucible Co., Tacony, Philadelphia, Pa.
Sand Mixing Mach. Co., 220 Broadway, New York, N. Y.
Sellers & Co., Wm., Philadelphia, Pa.
Shepard Elec. Crane & Hoist Co., Montour Falls, N. Y.
Sly Manufacturing Co., W. W., Cleveland, Ohio.
Standard Linseed Co., 501 Beckman Bldg., Cleveland, Ohio.
Standard Sand & Mach. Co., Cleveland, Ohio.
Sterling Wheelbarrow Co., West Allis, Wis.
Stevens, Frederic B., Detroit, Mich.
Superior Sand Co., Cleveland, Ohio.
Tabor Manufacturing Co., 1740 Hamilton street, Philadelphia, Pa.
Tate, Jones & Co., Pittsburg, Pa.
United States Graphite Co., Saginaw, Mich.
Wadsworth Core Mach. & Equipment Co., Cuyahoga Falls, Ohio.
Whiting Foundry Equipment Co., Harvey, Ill.
Wise, J. B., Watertown, N. Y.
Yale & Towne Mfg. Co., 9 Murray street, New York City, N. Y.
Williams-Davis Co., 14 Park place, New York City, N. Y.

NATIONAL ASSOCIATION OF BRASS MANUFACTURERS

President, Theo. Ahrens, Louisville, Ky.; Commissioner, William M. Webster, Chicago, Ill. All correspondence should be addressed to the Commissioner, William M. Webster, 1112 Schiller Theater Building, Chicago, Ill. The objects of the Association are to promote in all lawful ways the interests of firms engaged in the manufacture of brass goods. Meets every three months. Each meeting fixes the place and date of the meeting to follow, consequently there is no stated place. It has been customary for the Association to hold its Annual Meeting in New York City in December of each year. The Semi-Annual Meeting is generally held at Atlantic City or some other Sea Coast town. The next meeting will be held in Saratoga Springs, N. Y., June 27-28, 1911.

Commissioner Webster reports that the association held a most successful spring meeting at the Hotel Sherman, Chicago, Ill., on Tuesday and Wednesday, March 28 and 29. Several new members were elected to membership. A committee was appointed to take up and co-operate with the proper authorities at Washington, the question of establishing uniform patterns, designs, threads and standards for goods in the brass line used by the United States government. They decided to do away with the Pittsburg gauge hose thread as provided in the following resolution:

Whereas, The arbitrary thread, commonly known as the Pittsburg Gauge Hose Thread, having served its purpose and in a sense become burdensome as it requires the carrying of duplicate stock, and in the language of some of the Pittsburg jobbers has become "an imposition to the trade and a nuisance," and

Whereas, As we have the united wish of the Pittsburg jobbing trade, that we do away with same and refuse to make or sell brass goods with this odd or arbitrary thread in the future;

Therefore Be it Resolved, That we recognize the wishes of the Pittsburg jobbing trade and comply with their unanimous opinion and views in this matter and we hereby pledge ourselves not to make or sell brass goods with this gauge or thread after September 1, 1911, and be it

Further Resolved, That we instruct the Commissioner to take this matter up with the manufacturers of hose brass goods who are largely interested and brass manufacturers not members of this organization, with a view of securing their assistance and that in doing so, that he ask the co-operation of the Pittsburg jobbing trade.

NATIONAL ELECTROPLATERS' ASSOCIATION OF THE UNITED STATES AND CANADA

President, Charles H. Proctor, Arlington, N. J.; Treasurer, H. H. Reama, New York, N. Y.; Corresponding and Financial Secretary, Geo. B. Hogaboom; Recording Secretary, Royal F. Clark. All correspondence should be addressed to the Corresponding Secretary, Geo. B. Hogaboom, 656 Hunterdon St., Newark, N. J. This is an educational society, the objects of which are to promote the dissemination of knowledge concerning the art of electro-deposition of metals in all its branches. Meets at Grand Opera House Building, 309 W. 23d St., on the fourth Friday of each month, 8 p. m.

The tweney-sixth meeting of the association was held on Friday evening, March 24, 1911, with thirty-four members present. Minutes of the previous meeting were approved as read. The following were elected to active membership: C. S. Barbour, Geo. Barrow, Joseph Pflueger, Willard Symonds, Louis C. Bogner, John J. Burke, Daniel Schoonmaker, Amos Reeve, Geo. D. Jenison, Geo. Gilson, Joseph A. Hall.

The nomination of officers resulted as follows: For president, Proctor, Hogaboom, Baxter; first vice-president, Haddow, Stremel, Schneider; second vice-president, Painter, Sliter, Blassett; corresponding and financial secretary, Clark, Dimes, Faint, Schneider, Hogaboom; recording secretary, Clark, Dimes, Fisher, Faint, Sliter; treasurer, Reama; Librarian, Hoffman, Sliter, Dimes, Stremel, sergeant-at-arms, Voss, Sliter, Demar, Haddow, Duffy; assistant sergeant-at-arms; Smith, Schneider, Straub; board of trustees, Schneider, Haddow, Davis, Popper, Buchanan, Hogaboom, Steihle, Smith, Fink.

AMERICAN ELECTROCHEMICAL SOCIETY

This Society held its nineteenth general meeting in New York, April 6 to 8, 1911, at the new club house of the Chemists' Club, 54 East 41st street. The meeting, which was the most successful yet held by the Society, was taken up largely by the reading and discussion of papers by the members and by excursions to various industrial plants employing electrochemical processes in the vicinity of New York.

The papers read at the morning sessions included the following: "A New Laboratory Electric Furnace," M. M. Kohn; "The Johnson Electric Zinc Furnace," J. W. Richards; "The Electrolytic Corrosion of Electroplated Objects," W. S. Landis; "Some Problems of the Electroplater," G. B. Hogaboom; "The Haas-Oettel Electrolytic Cell," E. E. Niswonger; "The Mechanism of Electrolytic Transfer," J. W. Richards.

The first excursion was held Thursday afternoon (April 6), and was to the Laurel Hill works of the Nicholls Chemical Company, Brooklyn, N. Y. This company has the largest copper refinery in the world, producing 250 tons per day of pure refined copper. Here the party of 150 electro-chemists were shown the process of manufacture of copper from the making of the matte or blister copper through the bessemerizing process to the refining of the finished product. This company handles large quantities of South American ores, as well as those from the West. They manufacture copper in wire bars, anodes, slabs and also sulphuric acid from sulphur bearing copper ores. The afternoon of Friday, April 7, was devoted to three visits: The electro-plating plant of Hanson & Van Winkle Company, manufacturers of electro-plating material. The furnace laboratory of Dr. F. J. Maywald, 89 Pine street, New York City, comprising a very compact plant for the production of alternating and direct current in moderate quantity, and various types of electric furnaces for laboratory use. The Moss Engraving Company, a large plant which includes electro-engraving and electrotyping processes, at 297 Lafayette street. Visits to the New York Electrical Testing Laboratories, 80th street and East End avenue, chemical laboratory of the College of the City of New York, and Laboratories of Columbia University.

A pleasant incident took place at the beginning of the Newark excursion. Upon the arrival of the party of 35 at Newark they were met by Charles H. Proctor, president of the National Electro-platers' Association, who being presented to the party by their secretary, Prof. Richards, welcomed the visitors with a short address. At the works of the Hanson & Van Winkle Company the visitors were royally entertained by Messrs. Todd, Foster, Bedell and King, representing the company. After visiting the thoroughly modern and up-to-date demonstrating electro-plating plant, used chiefly for demonstrating their mechanical electro-plating apparatus, for electro-plating large quantities of work in bulk the party was taken to the handsome dining room of the new office building of the company, and a lunch of light refreshments was served.

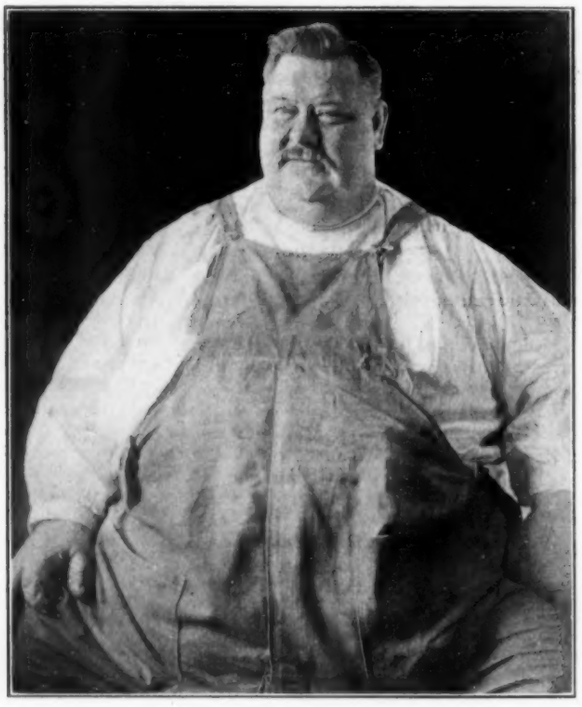
The last excursion took place Saturday, April 8, when a party of 100 visited the works of the American Smelting and Refining Company at Perth Amboy, N. J. Here at this gigantic plant, where Cuban and South African gold, silver and lead bearing copper ores are smelted and refined, all departments of the works were inspected and the various metallurgical processes were seen in operation. The basic lined converters for the bessemerizing of leady copper mattes; the Parkes process of lead, silver and gold separation; the making of pig lead; the parting of gold, silver and copper by the electrolytic separation, by means of which process 250 tons of copper are deposited daily. The Perth Amboy plant produces monthly 3,000,000 ounces of silver, 20,000 ounces of gold, and 7,500 tons of copper, consuming 15,000 tons of ore.

ITEMS OF INTEREST TO THE INDIVIDUAL.

A 518-POUND BRASS FINISHER

A common statement among machinists is that a brass finisher is doomed to be wan, thin and puny because his work is considered unhealthy, while an iron worker, having such a healthy occupation is sure to be large, fat and strong. A contradiction to this general statement is herewith presented in the portrait and sketch of Charles H. Jackson, a 518-pound brass finisher who resides at Brockton, Mass.

When Mr. Jackson was twenty years old he weighed 176 pounds but has grown heavier each successive year until now at the age of fifty-two he tips the scale at 518, wears a 24-in. collar, has a chest measurement of 65 ins., an arm measurement above the elbow, of 22 ins., his wrist measures 11½ ins., calf of leg 22 ins. and thigh 36 ins. He says that he does not eat more than the ordinary person and his greatest trouble is in not being able to drape himself properly.



CHARLES H. JACKSON.

He has practically been a brass finisher all his life, learning his trade with the Walworth Manufacturing Company, of Boston, Mass., in 1871 and staying with that firm for seventeen years, nine years of which time was devoted to metal pattern and model making. In 1889 he worked a short time for the Boston Woven Hose Company, and then went to the Crosby Steam Gage and Valve Company, where for thirteen years he was employed as department foreman. He then settled in Brockton as foreman for the Foss Valve and Specialty Company, which concern has since moved to St. Louis.

For the last four years Mr. Jackson has not been able to do much of anything, being dependent upon the earnings of his faithful wife. He reports that he has lived to see a great many changes in the method of doing work. He saw the first turret lathe which was put into the Walworth's, which lathe revolutionized the work being done at that shop.

August G. Hoffmann, formerly foreman plater for the Merigold Electroplating Company, jobbing platers, Newark, N. J., has formed a partnership with G. P. Clark, under the name of A. G. Hoffmann & Company, practical platinum depositors. The members of the firm are both expert platers and parties wishing work of this character are assured of most excellent results. The office of the firm is at 5 Milton avenue, Jersey City, N. J.

Charles H. Proctor, president of the National Electro-Platers Association, has been invited to serve on the General Committee of the Eighth International Congress of Applied Chemistry to be held in Washington and New York, September, 1912. This committee has charge of obtaining suitable papers for this section of the Congress. Mr. Proctor is asked to co-operate in the line of electroplating, coloring and engraving.

George I. Moore, who has been in the employ of the Elgin Watch Company, Elgin, Ill., for the past forty-four years as machinist, last week celebrated his seventy-eighth birthday. Mr. Moore was the last of the twenty-three employees who worked in the old down town factory of the Elgin Company, and he will receive a pension from the company during the rest of his life.

T. J. Sullivan has taken charge of the plating room of the Blickensderfer Manufacturing Company, Stamford, Conn. Mr. Sullivan was formerly in charge of the bank lock plating department of the Yale & Towne Manufacturing Company, of the same place.

William A. Westerman, superintendent of the Coe Brass Works, Ansonia, Conn., is spending a much needed vacation in Battle Creek, Mich., where he expects to stay for a month. This is the third vacation that Mr. Westerman has taken in forty years.

D. W. Robinson, formerly with the Blickensderfer Manufacturing Company, manufacturers of typewriting machines, Stamford, Conn., has taken charge of the plating room of the Remington Typewriter Works, Ilion, N. Y.

James R. Huber, who was formerly connected with the Detroit Copper and Brass Rolling Mills, Detroit, Mich., as chemist, now has a similar position with the Lumen Bearing Company, brass founders of Buffalo, N. Y.

Albert Orchelle has been appointed foundry superintendent of the Lunkenheimer Company, Cincinnati, O., to succeed Martin Burns. Mr. Orchelle was formerly assistant to Mr. Burns.

Edward J. Gutsche, formerly superintendent of the Gas Company, Flint, Mich., has accepted a position as chemist to the Detroit Copper & Brass Rolling Mills, Detroit, Mich.

Nelson F. Flanigan has taken full charge of the brass foundry of the Wiener-Barnet Company, manufacturers of automobile and saddlery hardware, Newark, N. J.

William Hennessy has taken charge of the plating room of the Yale and Towne Manufacturing Company, manufacturers of "Yale" products, Stamford, Conn.

Joseph W. Fox has succeeded Hugh McPhee as foundry foreman at the Tarrytown works of the Maxwell-Briscoe Motor Company.

Charles J. Caley, formerly general manager of the Russell & Erwin Manufacturing Company, New Britain, Conn., and who is well known throughout metal manufacturing circles in the United States, has resigned his position with the Peterborough Lock & Manufacturing Company of Peterborough, Canada, and has returned to the United States.

F. A. Johnson, formerly toolroom foreman for the Nathan Manufacturing Company, manufacturers of steam injectors, etc., New York, and a frequent contributor to the columns of THE METAL INDUSTRY, has become connected with Henry B. Haller, production engineer, 166 Devonshire street, Boston, Mass.

Thomas J. McGrath took charge of the foundry of Peck Brothers Company, New Haven, Conn., on March 1. Mr. McGrath was formerly with this concern for five years in the same capacity, having left there in 1906 to start a machine foundry for the P. & F. Corbin Company of New Britain, Conn.

CORPORATION OFFICERS ELECTED

James E. Pope, of the Pope Metals Company, was elected president of the New York Metal Exchange at the annual meeting, held April 3. A. B. Hall was chosen vice-president and Robert L. Crooke treasurer. The Board of Manager is as follows: B. Hochschild, H. W. Hendricks, G. E. Behr, E. Boerwald, Edwin Groves, Charles J. Marsh, W. Parsons Todd and A. Gardiner Cooper. The Arbitration Committee is composed of E. A. Caswell, E. J. Keane, P. R. Jennings, C. S. Trench and J. Langeloth.

At the annual meeting of the Waterbury Brass Company the following officers and directors were elected: President, James S. Elton; vice-president, Charles F. Brooker; treasurer, John P. Elton; assistant treasurer, H. Milroy Steele; secretary, Gilman C. Hill; directors, James S. Elton, Gilman C. Hill, John P. Elton, C. F. Brooker, E. L. Frisbie, James A. Doughty, Gordon W. Burnham.

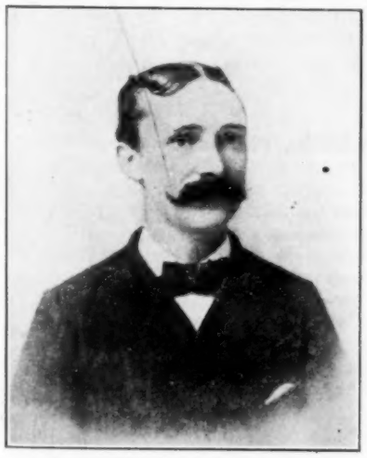
At the annual meeting of the Waterbury Brass Goods Corporation the following officers and directors were elected: President, John A. Coe, Jr.; treasurer, George H. Benham; secretary, George H. Benham; directors, C. F. Brooker, E. L. Frisbie, J. P. Elton, J. A. Doughty, T. B. Kent, G. C. Hill, G. W. Burnham, John A. Coe, Jr., and G. H. Benham.

At the annual meeting of the Waterbury Buckle Company the following officers and directors were elected: President, Archer J. Smith; treasurer, Archer J. Smith; secretary, Julius Maltby; directors, J. Richard Smith, Archer J. Smith, Julius Maltby, Henry S. Chase, Irving H. Chase, Ralph H. Smith and Robert F. Griggs.

DEATHS

JAMES McTAGGART

James McTaggart, supervisor of the metal cabinet division, National Cash Register Company, Dayton, Ohio, died at his home in that city on March 3, after an illness of several weeks.



JAMES McTAGGERT.

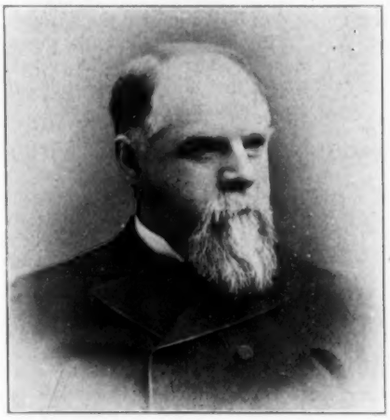
Mr. McTaggart was fifty-four years of age and had been connected with the National Cash Register Company for sixteen years.

Mr. McTaggart was born near Dumbarton in Scotland; had, with his good mother, a youth of hardship and privation owing to the early death of his father. He learned the trade of a molder, and when 23 years old, landed in New York, where he married and lived for two years. He then entered the employ and rose to be foreman of the Yale and Towne Manufacturing Company at Stamford, Conn., in whose service he continued for fourteen years.

Going to Dayton he became foreman of the brass foundry of the National Cash Register Company. After the brass foundry work, which he took charge of had become thoroughly systematized under his direction, he finally, at the urging of the officials of the company, assumed the wider duty of supervisor of the metal cabinet division, which office he held at the time of his death and where he had entire charge and control of 800 workmen. Mr. McTaggart was held in the highest esteem by the National Cash Register Company and at his death resolutions of sympathy were passed by the corporation, which also ordered an appropriate bronze tablet to be set up to his memory in the foundry where he had been so long occupied. He leaves a wife and two sons.

CHARLES ELLIOTT MITCHELL

Hon. Charles Elliott Mitchell, ex-United States Patent Commissioner and president of the Stanley Rule and Level Company, died Friday, March 17, at his home in New Britain, Conn., aged 73 years and 10 months. Up to the day previous to his death, Mr. Mitchell regularly attended to his duties as president of the Stanley Rule and Level Company.

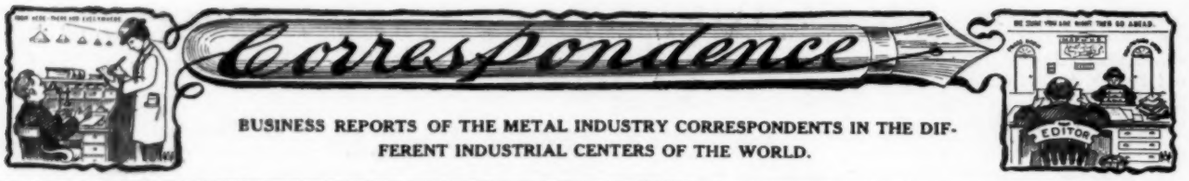


CHARLES ELLIOTT MITCHELL.

Mr. Mitchell was born in Bristol, Conn., in 1837, and was directly descended from old Puritan stock. Early in his career Mr. Mitchell made a specialty of patent law, and won a national reputation as one of the leading patent attorneys in the country. In 1889 he was appointed United States Commissioner of Patents by President Harrison.

Returning to New Britain in 1902, Mr. Mitchell became connected with the Stanley Rule and Level Company as president, and immediately retired from public life and devoted himself with his accustomed diligence to his duties at this factory. Besides his interest in the concern of which he was president, Mr. Mitchell was a stockholder in the following concerns: American Hardware Corporation; Bristol Brass Company; International Silver Company; Landers, Frary & Clark; Merganthaler Linotype Company; Stanley Works, and Trumbull Electrical Manufacturing Company. He was succeeded as president of the Stanley Rule and Level Company by Alix W. Stanley.

William H. Cloudman, assistant superintendent of the Elgin National Watch Company, Elgin, Illinois, died suddenly at his home on March 19, at the age of sixty-nine.



BUSINESS REPORTS OF THE METAL INDUSTRY CORRESPONDENTS IN THE DIFFERENT INDUSTRIAL CENTERS OF THE WORLD.

PROVIDENCE, R. I.

April 3, 1911.

There never was a time in the history of this city that there were so many avenues for commercial improvement and expansion of industries as there is at present. The city, state and nation have made appropriations aggregating more than a quarter of a million dollars for the widening, straightening and improving of the Providence harbor and its approach from Narragansett Bay, and the building of docking facilities. The Grand Trunk Railway has secured a charter and is working out a layout to connect this city at tide water with the great Northwest by way of Montreal, and several transatlantic steamship companies have signified their intention of making this a port of entry from Mediterranean countries.

These activities are sufficient to open new vistas in the industrial future of Providence, and incidentally the entire southeastern section of New England. Coupled with these are the possibilities resulting from the reciprocal arrangement that has been suggested with the Canadian provinces. It is generally believed hereabouts that while reciprocity with Canada might not prove advantageous for the country at large, it certainly would prove beneficial to the New England section.

Speaking of the proposed reciprocity with Canada, George W. Gardiner, collector of customs in this city, recently declared that "to us in New England, the resources and products of Canada are not as much appreciated as they should be. We must bear in mind that Canada borders us for a length of practically 3,000 miles. This is a matter of vital concern to this community, in view of the contemplated transcontinental Canadian railroad, and the tapping of a section of the country known as the 'last Great West.' In order to show the business growth of the country we must consider that in ten years' time Canada has materially changed the flow of the tide of gold between the two countries. In 1899 we exported to Canada, $4,000,000 worth of gold and imported $15,000,000 worth. In 1909 we exported $18,000,000 worth and imported only $10,000,000 worth.

"The total value of all merchandise of Canadian origin covered by the reciprocity plan as shown by the importations into this country during the last fiscal year, cannot be definitely ascertained, but approximates $45,000,000, which amounts to about 40 per cent. of the entire imports into the United States from Canada. Our exports to Canada of merchandise covered by the agreement approximates $50,000,000, or about 23 per cent. of our total exports to that country.

"It is possible of course for us here in Providence to conceive that with facilities for freer trade with the Dominion of Canada, there will be greater possibilities for the development of the trade and industries of that country and a reciprocating advantage for the United States. This is a matter of very vital concern to this community for in that great region with which we are soon to be brought in touch, exists a wheat area which is said to be four times the entire wheat area of the United States, and he must be imaginative indeed who cannot picture in the future the advantages to the United States of the development of this vast, resourceful region."

The proposition to enter into reciprocal relations with the Dominion has been received on the part of manufacturing jewelers and silversmiths with many inquiries as to the results upon their industry. There is some diversity of opinion, although no definite statements are made. The matter has already been the subject of discussion at the meetings of the New England Manufacturing Jewelers and Silversmiths' Association, as well as by the Jewelers' Board of Trade, and special committees have been appointed by both bodies to make a careful inquiry and study of the conditions and the outcome. No action further than this has been taken, however.

According to announcements recently made the Gorham Manufacturing Company's sales during the fiscal year ending February 1, 1911, amounted to $6,311,983, an increase of $311,616 over the record for the preceding year. The net earnings were in excess of $700,000 and out of this amount were paid $420,000 in dividends—10 per cent. on the common stock and 6 per cent. on the preferred stock. The sum remaining, available for addition to the surplus, was apparently nearly $300,000, so that the company earned about 20 per cent. on its common stock last year. The sales of the company's English branch showed an increase over those in the preceding year. Not every investor is aware of an English branch, but it should be remembered that the Gorham is the largest and best-known silver manufacturing concern in the world. The present surplus of the corporation is said to be in the neighborhood of $3,000,000.

Fully 90 per cent. of the common stock of the Gorham Manufacturing Company is owned by The Silversmiths' Company, and the Gorham Manufacturing Company of Rhode Island owns all the stock of the Gorham Company of New York. Stock of the Silversmiths' Company is not very active in this market, but the outlook for it is excellent.

Among the recent work finished at the bronze factory of the Gorham Manufacturing Company, in this city, was a memorial tablet to the sailors for Bancroft Hall, Annapolis, Md., weighing 1,500 pounds; an eight-foot statue of Admiral Foote; a statue of Augustus Belmont for the New York Public Library, and one of Abraham Lincoln, weighing more than 3,500 pounds, for Newark, N. J.

The Providence Architectural Metal Works have recently completed a new office building adjacent to their plant at 237 Dyer street. The new building which they are to occupy themselves is built entirely of metal and clearly shows the ability of the concern to do first-class work in the sheet metal line.

The Atlas Company (Horace Farmer, manager), has started in the electroplating business in gold, silver, copper and nickel at 8 Baptist street, corner of Meeting street, Pawtucket.—W. H. M.

NEWARK, N. J.

April 3, 1911.

Business has not opened up strong yet with the manufacturing jewelry trade, and while there is a fair demand, there is no general stocking up. The large buyers are taking only moderate quantities, and the small buyers only what is needed for immediate requirements. All seem to be doing enough business to get along, new firms are starting in every month, others are moving and enlarging, but there is no real strength to the market. It is no worse than other lines and all trade are similarly affected. The 10-karat goods are selling much better, the 14-karat lines are slower.

The tariff question is coming up strongly now. The local Manufacturing Jewelers' Association has gone on record as favoring a tariff commission or board, such as we now have to settle these matters, rather than any radical legislation at Washington. It is admitted many necessaries of life must come down, but not to jump on all industries. The trade here would oppose any lowering of the tariff on jewelry and allied lines, as the Germans, the French, Austrians, Italians, and Japanese would flood this country with jewelry cheaper than it could ever be made here at present wages. Even as it is, some complain and say that on some lines the duty is not high enough. Some time ago, George R. Howe, of Carter, Howe & Co., went to Washington to favor a tariff board and he is one of the leaders in the movement. The Newark association was also acting in conjunction with the New York association.

As to reciprocity, the trade favors this, as it is recognized that it will help reduce the cost of living and will foster the trade relations between the United States and Canada. It will tend to increase the trade in all lines, whether directly affected by the present reciprocity agreement or not. It can not disturb the trade prospects and must of necessity do good. Farmers, and

some of the trades directly affected will oppose the idea, but the majority of the people no doubt favor some such measure.

One of the sensations of the month is the failure of William Smith & Company, manufacturing chains at 407 Mulberry street, and whose main office is at 9 Maiden Lane, New York City. The liabilities are $119,696, and assets $18,862.

The Leo D. Greenfield Manufacturing Company, making metal buckles, have moved from 64 Railroad avenue to 67 Hamilton street. The plant has been enlarged, new machinery put in, the output increased, more hands at work, and are making a new line of novelties. A plating plant has been put in.

The Whitehead & Hoag Company was reported as having moved to Sussex avenue and First street. They are still on Washington street, but have bought a plot of ground at the address mentioned and will erect a factory there.

The Leedin Novelty Company, making metal novelties, have a much improved factory since they moved to Boyden place. The factory is larger, better equipped, more machinery and turn out considerably more work. Their output will be doubled this year. The firm has also taken up the making of German silver mesh bags.

J. Wiss & Sons, one of the largest cutlery manufacturers in the country, have put up a large business building at 665 Broad street, which has 130 offices in it, and the lower floor is occupied by their retail jewelry store. The building is one of the most modern kinds and is fully up to date.

Herman F. Behrendt, who was superintendent for the Reusch Machine Company, started in business for himself at 22 Green street, to manufacture jewelers' and silversmiths' tools, machinery, dies, etc. The Reusch Company vacated the building where he is and moved to 401 Mulberry street.

William C. Fink, of Elizabeth, has sold out his silver novelty manufacturing business and is now devoting all his time to acting as a consulting specialist in metallurgy. He will undertake to improve the operation and output of any factory that comes in his line.

The Art Metal Works, Louis Aronson, proprietor, is busy making metal clock cases and novelties of brass, and other metals. A. Harris is one of the general managers. The output of the concern is increasing every year.

The Long & Koch Company has finished their new jewelry factory on South street, and it will be a great improvement to that section.

A new firm opened up is Henry Leibe & Son, who are making 10 to 14 karat general line of jewelry, in the Schlosstein Building, and also will make gold and silver lorgnettes. Henry Leibe was foreman for the factory of Carter, Howe & Company.

Stevens & Leithoff, late of Arlington street, have built a new factory for themselves at Cottage and Grace street, Irvington, near this city. New machinery was put in and the force was doubled. They used to make lorgnettes, vanity bags and match safes of gold and silver, but are now making a new line of gold and silver mesh bags. They are in the new building.

Joseph Mason has retired from the manufacturing jewelry business at 38 Crawford street.—H. S.

DETROIT, MICH.

April 3, 1911.

Reciprocity and the tariff are subjects that have commanded the attention of Detroit manufacturers for the past several weeks and will continue to be important issues for discussion until after legislation has settled the contention for an indefinite period. Probably no other section in the country takes greater interest in these two matters than Detroit. Situated directly on the border and separated only by a comparatively narrow river, this port has been the gateway for years for a great trade with the Dominion. As years progress the city is destined to become more of a distributing point for the Canadian trade. Its situation is more advantageous than any other on the border in this regard. There is no wonder then that manufacturers of all branches of trade are anxious that these two important matters should be settled in a manner that will aid trade with the neighbor to the north. Concerns engaged in the production of brass and aluminum and every other article that requires a great quantity of this product, are particularly interested in any legislation that will stimulate trade and open broader markets.

Every brass, aluminum, and lead manufacturer, without doubt, in Detroit, is in favor of the proposed Canadian reciprocity. They know that there is a great market lying to the north that will quickly open to their products when the duty is taken off manufactured brass and aluminum. The Dominion of Canada is a great, growing country, and while the population at present is not much larger than New York State, the outlook for the future is almost beyond comprehension. Thousands of persons are every year emigrating to the Canadian northwest where they are engaging in agricultural pursuits. They are opening up great farms that require a vast quantity of machinery and this very machinery is equipped with brass and aluminum parts that are manufactured in the States. Then there are springing up towns all over this western territory that are filled with Americans who are true to their birth and will buy an article manufactured in the States every time. Winnipeg, the center of this country, is growing with leaps and bounds and demands American machinery with American brass and aluminum. This demand will be increased beyond comprehension once the duty is taken off imports. The brass and aluminum manufacturers in Detroit know this and so do other manufacturers of products demanded in the Canadian northwest as well as in other parts of the Dominion. While the trade in articles made in the States is on the increase, the manufacturers want to expand it and will, if the proposed reciprocity treaty is ratified. In brief this is why the manufacturers in Detroit, and in fact every border city, demand that the treaty become a law as soon as possible.

Mr. R. J. Service, secretary and treasurer of the McRae & Roberts Brass Works, in discussing the subject declared reciprocity will enormously stimulate the brass and aluminum industry in Detroit and in every part of the United States. It means the opening up of a great field, he declares, and manufacturers will see results almost immediately. Suppose all the Atlantic States had been shut off from the middle west so far as trade relations are concerned in brass and aluminum. Then suddenly a law was enacted that threw that territory open to trade. What would be the result? A general rush of business, of course, with factories in the West booming and a stimulation of trade all along the line Such a condition as this will be realized when the Canadian market is opened through reciprocity. Mr. Service also is in favor of a general tariff revision.

"I believe that anything along this line would be better than nothing," he said. "It is this uncertainty that retards manufacturing in every city in the country." Then, again, he declared most imphatically in favor of tariff revision not by Congress, but by a permanent tariff board. Like all other brass manufacturers in Detroit he explained his position on this question like this:

"A well organized tariff board composed of members who are intelligent and not politicians, but who have perfected themselves in this particular branch of legislation, would be a far more effective body to handle the tariff question than Congress which is composed of a large number of men, the majority of whom are not sufficiently qualified to handle the vital tariff questions that are needed to be taken into consideration. Congress is too big properly to settle the tariff question. There is too much politics mixed with the tariff question that at any time might cause a disaster."

Mr. A. Clement, one of the proprietors of the Art, Brass & Wire Works, takes the same stand as Mr. Service. In fact he expressed his ideas in regard to reciprocity and tariff revision in almost the exact terms. He sees great prospects for the brass and aluminum industry in the proposed reciprocity treaty. In his opinion it means a great stimulation of business by the opening up of a field that heretofore had been limited because of the tariff gates being almost closed to the Canadian markets.

Mr. Brabant, president of the Peninsular Brass Works, is another well-known manufacturer who favors reciprocity and a revision of the tariff through a permanent board whose members are trained for this particular business. Mr. Brabant stands on the same ground as the other brass and aluminum manufacturers in Detroit. He is most emphatically for reciprocity and any other legislation that will aid manufacturers throughout the United States.

Mr. W. B. Howard, president of the Detroit Foundry Supply Company, who is probably as close to the brass manufacturing industry and those engaged in the business, as any man in Detroit, stands strong for reciprocity and a revision of the tariff by a board of intelligent and trained men. Speaking of reciprocity Mr. Howard said:

"While we have a large plant across the river in Windsor, Ontario, we are just as much in favor of reciprocity as any other concern in Detroit. We believe that free trade with the Dominion will open up a great market for the brass and aluminum manufacturers in this country. Detroit will be benefitted more than any other city on the border, for the reason we are practically the gateway to Canada which in years to come is going to be one of the most fertile fields for the United States brass manufacturers. Canada wants our manufactured products and we certainly want to sell them."

Mr. Howard declared every brass and aluminum manufacturer in Detroit so far as he can learn is strong for reciprocity. In fact he said there is hardly a manufacturer in the city who is not in favor of free trade. In every line of trade this sentiment is expressed.

With the approach of spring business the brass and aluminum industries are taking on new life and there is every indication that the coming season will be a good one in the history of Detroit. Some anxiety was expressed during the latter part of the winter lest business for 1911 would fall below the average. This thought was practicularly emphasized when some of the railroads began to cut salaries and begin a general move towards retrenchment. But the anxiety of a few weeks ago has entirely disappeared with a few exceptions, and manufacturers in every line of business, especially brass and aluminum, are now much encouraged.

The spring revival in building has stimulated the plumbing business and manufacturers in this line of brass have seen a great improvement. Orders are coming in more rapidly than they have for some weeks. Taking everything as a whole the prospects for the season are encouraging.—F. J. H.

MONTREAL, CANADA

April 3, 1911.

The proposed reciprocity agreement between Canada and the United States is being viewed with anything but favor by the bulk of the manufacturers and capitalists of Montreal. An Anti-Reciprocity League, backed with big subscriptions from leading city magnates and by several influential newspapers, has been formed, and the public are being daily treated to all sorts of depressing predictions regarding the ruin of Canadian industry and ultimate annexation. But the effects of these alarmist outcries has been considerably nullified by the statesmanlike pronouncements of Messrs. Fielding and Fisher, Ministers of Finance and Agriculture respectively, who visited Montreal on last Saturday and addressed a mass meeting in the Windsor Hall, in support of the reciprocity proposals.

It is now more generally understood that manufactured articles are very little affected by the proposed agreement, in fact agricultural implements are almost the only factory products touched, and even on these, the reduction in duty is very slight, amounting only to 5% on some and 2½% on others. It is felt that reciprocity will be of much benefit to Canadian farmers by opening up to them the big American market, and on the whole, notwithstanding the powerful influences opposed to ratification of the treaty and the scare cries which are being raised, it may be safely said that the population of Montreal is about evenly divided on the question.

The majority of the men in the metal trades here do not regard the agreement as of very much moment from their point of view, as the goods they handle are not affected one way or the other, and they do not think there will be any division of trade as a result of the reciprocity now proposed. Of course the "Antis" are never done telling them that this is only the thin end of the wedge, and will be followed later by a reduction in the duties on many classes of manufactured goods. But it must have been rather a shock to these alarmists when they were told by more than one firm of metal works that a further agreement, extending to certain brass goods, would be welcomed, as there is a respectable and growing trade between Montreal and numerous towns along the border line, notably Russell and Burlington, Vt., in these lines.

Montreal brass workers have indeed for some time past been sending some of their products across the border and not withstanding the very high tariff of forty-five per cent., have been competing successfully with American manufacturers. Needless to say a reduction in the tariff would be hailed with delight by these people, as they believe it would enable them to greatly extend their trade in the United States.

TRADE NEWS

TRADE NEWS OF INTEREST DESIRED FROM ALL OF OUR READERS. ADDRESS THE METAL INDUSTRY, 99 JOHN STREET, NEW YORK

ADDITIONAL TRADE NEWS WILL BE FOUND UNDER "CORRESPONDENCE."

The Brandt-Dent Company, Watertown, Wis., announce that they are contemplating the erection of an extension to their brass foundry, 32 by 32 feet.

F. W. Meyer has opened a general plating shop at 315 Second street, Jersey City, N. J. Mr. Meyer makes a specialty of plating tableware, cake trays, tea sets, etc.

During the year 1910 the Stevens-Duryea Company, automobile manufacturers, Springfield, Mass., used over 22,000 feet of brass tubing and 162,000 square feet of aluminum.

The Rome Wire Company, Rome, N. Y., are completing an addition to their plant which will be used for the manufacture of electric wires, bare and insulated, which are known under the trade name of "Romeoid."

The National Metal Reduction Company, smelters, refiners and dealers in white metals, Cleveland, Ohio, are building an up-to-date plant, to be used for the smelting of aluminum alloys and ingots, also zinc, solder, babbitts and type metals.

It is reported that a large metal factory for the manufacture of car brasses, babbitts, solder, type and bell metal will shortly be established in Denver, Colo. It is said that $200,000 will be available if a suitable location can be obtained.

The Abbott Ball Company, Hartford, Conn., originators of the well known Abbott process for burnishing metal goods by tumbling with steel balls, have placed their agency for Germany and Austria with Friedrich Wegener, Langestrasse 24, Berlin O 17, Germany.

The Yale & Towne Manufacturing Company, Stamford, Conn., recently decided to establish a plant at St. Catharines, Ont., for the manufacture of their line of builders' hardware, chain blocks, etc. The ground for the plant has already been acquired, and it is hoped to have the plant in effective operation early in 1912.

Sealed proposals will be received at the Bureau of Engraving, Treasury Department, Washington, D. C., until 2 p. m. Monday, May 1, 1911, to furnish during the fiscal year beginning July 1, 1911, brass castings. Blank forms, with specifications, will be furnished intending bidders on application to Joseph E. Ralph, Director of Bureau.

The Columbus Auto Brass Company, manufacturers of radiators and rebuilders of cars, Columbus, Ohio, report that they have had to add more space and benches to take care of several new departments that they have added. When this company was incorporated two years ago they only employed four men, while at the present time their force numbers fifty.

The Charlotte Brass Works, J. A. Bradford, proprietor, Charlotte, N. C., who some time ago purchased the equipment of the Fielding Brass Company, announces that in ad-

dition to making castings for the trade, plumbers and machinists supplies, that they expect to put on the market at an early date several brands of superior babbitt metal.

The Goldschmidt Thermit Company, New York, has recently increased its force of metallurgists by acquiring the services of Dr. E. A. Beck. Dr. Beck brings to his new position a varied experience in the metallurgical field, and the company will be glad to give technical advice on all matters pertaining to the use of its metals and alloys in the production of special steels, brass and bronze.

The Aluminum Manufacturing Company, Des Moines, Ia., manufacturers of articles in cast aluminum ware, is now occupying new quarters which furnish facilities for practically doubling the capacity. H. B. Klusmeyer, the president and general manager of the concern, a practical man in the aluminum ware business, is now devoting all of his time to the development of the trade.

The Doehler Die Casting Company, Brooklyn, N. Y., are building an addition to their factory at Court and 9th streets which is nearly completed. The new building is constructed of concrete and adjoins their present factory and will give this fast growing concern additional facilities for handling their large business, which consists of making die castings of all kinds and die casting machinery.

At the annual meeting of R. Wallace & Sons Company, manufacturers of silver-plated ware, Wallingford, Conn., the following directors and officers were elected: Directors: Frank A. Wallace, Henry L. Wallace, Clifford W. Leavenworth, Dennis T. Morris, Charles D. Morris, Robert W. Morris and Arthur W. Wallace; president, C. W. Leavenworth; assistant treasurer and superintendent, Charles D. Morris.

The West Penn Plating and Manufacturing Company, electroplaters in all metals, 1308-10 E. Ohio street, Pittsburg, Pa., have secured additional floor space and installed new punch presses. In addition to their regular line of pipe hooks, straps and hangers the company have added a vacuum carpet cleaner, and are contemplating the installation of a foundry to produce aluminum and brass castings.

The Ideal Furnace Company, Chester, Pa., have recently installed furnaces at the plants of The Gamon Meter Company, Newark, N. J., J. E. Lonergon & Company, Philadelphia, Pa., and the Crown Pipe & Foundry Company, Jackson, Ohio. Brey & Krause Manufacturing Company, Allentown, Pa., have also added another Ideal furnace to their equipment. The Duplex Metals Company, Chester, Pa., have added two No. 1 furnaces.

The Eureka Pneumatic Spray Company, 276 Spring street, New York, has secured patents on the "Eureka" Art Finishes, which have been described in THE METAL INDUSTRY from time to time, and announce that they will issue licenses to use the process free of charge to manufacturers who use Eureka sprayers and enamels exclusively for the production of the finishes.

The Western Brass Manufacturing Works, manufacturers of standard and special hardware and auto accessories in brass, bronze, aluminum and iron, 2011 Marshall Boulevard, Chicago, Ill., are erecting at the above address a modern foundry building, which will be completed at an early date and will give the company sufficient space to meet any demands that may be made on their facilities.

The Frontier Brass Foundry, manufacturers of brass, bronze and aluminum, Niagara Falls, N. Y., report by J. Lebherz, that they are completing a brass foundry, 50 by 110 feet, containing offices, pattern, storage, fuel and stock rooms. They will have twelve pit furnaces and a half-ton Schwartz furnace, together with all modern improvements. The company will take possession about May 1. The total cost of the building will be about $15,000.

The removal of the main offices of the Aluminum Goods Manufacturing Company from Newark, N. J., to Manitowoc, Wis., as reported in the February number of THE METAL INDUSTRY has been accomplished. G. A. Kruttschnitt has retired from the company, and the officers now are George Vits, president and general manager; James Koenig, vice-president and general superintendent; F. J. Magee, secretary and treasurer. The Newark, N. J., factory will continue to be operated along the same lines as heretofore, with J. H. Opp as manager.

The Genesee Metal Company, Rochester, N. Y., G. R. Coates, president and treasurer; F. W. Reidenbach, vice-president and general manager, announces that they are at present producing the highest grade of yellow brass ingot and are able to match both in quality and price any mixture that the metal consumer desires. The Genesee Metal Company are also large manufacturers of white metals and do some export business, having shipped babbitt metal as far as Helsingfore, Finland. They are ready at all times to produce metal according to specification.

The brass, bronze and copper business of the Brighton Brass and Bronze Company, New Brighton, Pa., and the bronze and copper department formerly operated by the Best Manufacturing Company of Pittsburg, has been taken over by The Keystone Bronze Company, Pittsburg, Pa. John S. Craig, secretary and treasurer of the above company states that the bronze and copper department will continue to operate its own plant and that the company is in a good position to produce copper, bronze and aluminum castings, babbitt metals, blast furnace tuyeres, coolers, etc., in large quantities. This concern is also the sole manufacturer of Keystone valves, acid proof metal, Knox patent copper water-cooled open hearth furnace doors, etc., and will also produce copper jackets for copper smelters.

Frederic B. Stevens, Detroit, Mich., the well-known manufacturer of foundry facings and supplies, importer of East India plumbago, and also dealer in polishers' and platers' supplies, announces that he has installed recently complete polishing and plating plants for the following concerns: Gem City Plating Company, Dayton, Ohio; Samuel C. Tatum Company, Cincinnati, Ohio; Miller Rubber Company, Akron, Ohio; Troy Carriage Sun Shade Company, Troy, Ohio; Searchlight Gas Company, Warren, Ohio. Mr. Stevens says he is now in a position to supply complete polishing and plating equipments, and that his new catalogue, distributed April 1, illustrates and describes everything required in the plating and polishing of metal, including a complete line of buffing compositions, supplies of all kinds and equipment, such as dynamos, buffing lathes, etc.

The entire executive force of the Lozier Motor Company is now installed in the administration building of the new Lozier factory on Mack avenue, Detroit, Mich. The principal active executive officers and heads of departments occupying the new offices are as follows:

H. A. Lozier, president; F. C. Chandler, vice-president and sales manager; Samuel Regar, assistant treasurer; C. A. Emise, manager of advertising; E. G. Cleary, cashier and accounting department.

The general factory management is also centralized in Detroit under Chief Engineer John G. Perrin, both factories, at Detroit and Plattsburgh, being under his charge. Eighty per cent. of the machinery has been installed in the new Detroit plant and it is expected that the factory will be in operation this month.

H. M. Shimer & Company announce that they are establishing a rolling mill at their works, 19th street and Washington avenue, Philadelphia, Pa., where they will manufacture phosphor bronze and German silver in sheet, wire and rod, making a specialty of German silver for spinning purposes; also a special new nickel alloy which has a tensile strength of 40,000 pounds per square inch. The phosphor bronze has a guaranteed tensile strength of 130,000 pounds per square inch. The company has discontinued the manufacture of the well-known "Golden Rod" spelter except as required for their own use, but will manufacture brazing solder, guinea gold alloys and shot copper, which will be shipped in air tight tins with screw tops to protect it from

the atmosphere. The equipment which the new company is installing is modern in every respect and it is expected that it will be in operation the latter part of May. The company is ready to quote for the June delivery and solicits inquiries for any of the products mentioned above. H. M. Shimer is president of the new organization and William P. McGlynn, formerly of the Riverside Metal Company, Riverside, N. J., is vice-president.

RECEIVER'S NOTICE

In a statement issued on the 17th of March, the creditors of the Levett Manufacturing Company, Matawan, N. J., announced that in order to protect the assets of the company it became necessary to apply for a receiver in the New Jersey courts. The statement was signed by Wellington, Sears & Company, H. B. Claflin Company (by Morris B. Arnold); Amoskeag Manufacturing Company (by George Walcott, chairman of the committee). Since this announcement, Willard Haff, of Wellington, Sears and Company, 66 Worth street, New York, has been appointed receiver, and the law firm of James, Schell & Elkus, 170 Broadway, New York, have become the attorneys to look after the creditors' interests. The receiver and attorneys state that the plant at Matawan is producing goods and will continue to manufacture pending a settlement of the company's affairs. It is hoped that a responsible party will take over the plant and the good will of the business and continue the manufacturing of platers' and polishers' supplies.

In our March number we published a statement from the company in which they said that the corporation had been reorganized and all friction eliminated between the respective stockholders, but within a week of this announcement it was thought advisable to apply for a receivership.

The Levett Manufacturing Company was organized in 1909 and had their main office in New York and a factory at Matawan, N. J. On October 3, 1910, they bought the entire property and good will of the Zucker & Levett & Loeb Company, which was then in the hands of a receiver, and removed the machinery, etc., thus acquired to their own factory at Matawan. This greatly increased their facilities and the volume of business transacted grew rapidly until the events noted above took place, which led to the appointment of a receiver.

REMOVALS

The Connecticut Dynamo & Motor Company are completing the removal of their plant from New York City to Lyons avenue and Coit street, Irvington, N. J., where they are establishing splendid manufacturing facilities. This concern manufactured all the dynamos sold by the Zucker & Levett & Loeb Company of New York for the past eighteen years and now that the latter concern is out of business they are prepared to furnish similar dynamos to the trade, also repair parts for any of the dynamos shipped by Zucker & Levett & Loeb Company. The president of the Connecticut Dynamo & Motor Company, D. McDermid, who was treasurer of the Zucker & Levett & Loeb Company, is in charge of the manufacturing as he has been since the establishment of the company in 1888.

INCREASE OF CAPITAL STOCK

The capital stock of the Osborn Manufacturing Company, Cleveland, Ohio, has been increased from $100,000 to $200,000.

The capital stock of the Kettler Brass Manufacturing Company, Houston, Tex., has been increased from $30,000 to $60,000.

The capital stock of the Standard Brass and Copper Tube Company, New London, Conn., has been increased from $50,000 to $75,000.

In order to enlarge their facilities for handling increased business the Standard Foundry Company, of Detroit, Mich., have increased their capital stock from $40,000 to $100,000.

FIRES

The J. F. Riley Foundry and Machine Shops, Charleston, S. C., were entirely destroyed by fire on March 19, causing a loss of $40,000 which was partially covered by insurance. The company has started to rebuild and expects to have the entire plant, which includes a brass foundry, ready for work in about six weeks.

INCORPORATIONS

Business organizations incorporated recently. In addressing them it is advisable to include also the names of the incorporators and their residence. Particulars of additional incorporations may frequently be found in the "Correspondence" columns.

BRASS AND COPPER PRODUCTS COMPANY, New York. Capital stock $25,000. To deal in all kinds of metals and products. Incorporators: I. Marrus, E. M. May, Alfred R. Bunnell, all of New York.

THEODORE HOEFELLER & COMPANY, Buffalo, N. Y. Capital stock $200,000. To deal in scrap and new metals, rubber, etc. Incorporators: T. Hoefeller, E. D. Hoefeller and M. D. Short, all of Buffalo.

PRINTED MATTER

NONESUCH PLATING BARREL.—Rockhill & Vietor, 114 John street, New York, have issued a complete set of instructions (circular "A") for installing and operating the "Nonesuch" plating barrel which, as readers of THE METAL INDUSTRY know, was placed on the market last year and has since been installed in a large number of prominent factories.

CIRCULAR.—The U. T. Hungerford Brass & Copper Company, 505 Pearl street, New York, have issued a circular giving full particulars of their "Star Brand Materials," which includes brass, copper, bronze, German silver, platers metal, yellow (Muntz) metal, obin bronze, etc. The Hungerford Company also issue a "Stock Catalog," which they mail on request.

COPPER RESIDUES.—White & Bros., Inc., copper smelters and refiners, Philadelphia, Pa., issue a folder which shows a number of interior and exterior views of their large refinery and which gives a number of convincing reasons why they should be permitted to quote prices on brass and copper skimmings, sweepings, buffings, grindings, etc., to all who have such materials for sale.

COPPER CLAD STEEL.—The Duplex Metals Company, manufacturers of copper clad metal, Chester, Pa., have issued a handbook of 60 pages giving complete description of their product and its manufacture. The title of the book is the "Copper Clad Hand Book," and contains valuable information in the shape of reading matter and tables of data regarding copper clad products. Copies of the hand book will be furnished upon application.

ENAMELS.—The Celluloid Zapon Company, New York, have issued a little twenty-page booklet describing briefly the method of applying their colored enamels and also the ways in which some of the new finishes can be produced. The book gives very valuable instruction in the production of finishes in two-color and artistic metallic effects on lamps, novelties, etc. A booklet called Colored Celluloid Enamels, fourth edition, accompanies the instruction book and shows the various colors capable of being produced both body and tinted. Copies of these booklets free upon request.

AD NEWS

The Osborn Manufacturing Company, 5407 East Hamilton avenue, Cleveland, O., have an attractive advertisement in this issue relating to the Osborn adjustable flask stripping molding machine.

The North American Smelting Company, Philadelphia, Pa., are again advertising their phosphor, manganese and other bronzes, ingot copper and brass, babbitt type metal, solder, lead and block tin pipe, etc. They also make brass and bronze castings of almost any description.

The General Bakelite Company, 98 William street, New York, are advertising Bakelite lacquers, which are entirely new and which have certain unique qualities that the company claims render them very valuable for use in finishing metals. Their "Booklet 1" gives full particulars.

The National Metal Reduction Company, 5305 Sweeney avenue, Cleveland, O., have a card in this issue in which they mention their principle specialties, including guaranteed aluminum and alloys, double refined spelter and solder. This concern also buys drosses, skimmings, scrap and turnings.

The Blue Ridge Metal Manufacturing Company, Susquehanna, Pa., advertise their facilities for quoting low prices for manufacturing sheet metal goods of every description, special tools and dies, and for doing polishing and plating. They invite interested persons to send samples on which they want estimates.

The Connecticut Dynamo and Motor Company, Irvington, N. J., are advertising in this issue the Rotoplater, which, as is well known, was formerly handled by the Zucker & Levett & Loeb Company. The Rotoplater was one of the first and is one of the most widely used mechanical plating machines on the market.

Benjamin's, Incorporated, 257 North 3rd street, Philadelphia, Pa., announce that they are always ready to buy in large or small quantities, second-hand brass working machinery, jewelers' and iron working machinery. This firm sells belting, dynamos, motors, etc. They have a branch office at 220 Centre street, New York.

The Sargeant Manufacturing Company, 77 Summit street, Newark, N. J., whose card appears in this issue, solicits inquiries from parties desiring to have light or medium weight novelties or hardware specialties manufactured. They have a large, well-equipped plant with foundry, drop-forging, finishing and plating departments.

The U. S. Electro Galvanizing Company, 1-9 Park avenue, Brooklyn, N. Y., illustrate on the front cover a galvanizing plant installed for Government work at Babcock and Wilcox's boiler works at Bayonne, N. J. Those interested in electro-galvanizing can obtain printed matter relating to the U. S. Electro Galvanizing Company's process by addressing their department "B."

Fitz, Dana & Co., 110 North street, Boston, Mass., importers and dealers in metals, announce that they carry in stock at all times pig tin, ingot copper, spelter, lead, antimony, Babbitt metals, aluminum, Ajax manganese bronze and Ajax plastic bronze. By addressing department "A" full particulars and quotations can be obtained.

The Bacon Felt Company, Winchester, Mass., are advertising Bacon's patent felt polishing wheels in this issue. The present officers of this company represent the fourth generation of felt manufacturers and the experience that they have gained is attested to by the reputation which their goods have in the market. They invite users of feltings, waddings and felt polishing wheels to send for their circular "A."

THE STORY OF THE FISHER FURNACE

Among the machines which have had a phenomenal rise and sale during the four years that it has been on the market is the brass furnace made and sold by Alfred Fisher, 616 W. Monroe street, Chicago.

The following is only a partial list of sales of the Fisher furnace during the past four years, and is appended to show the class of firms using it, and, most important of all, the number of repeat orders. No good firm is going to send in the second order for a machine if they are not satisfied with the first, but in one instance here a firm ordered one furnace and then later sent in eleven more different orders for that many furnaces. The figures after the name indicate the number of furnaces ordered at first, and the next figure after the dash indicated the number ordered on the second order, then the balance is placed on the third figure, though the orders in some cases amounted to as many as twelve:

Penberthy Injector Company, Windsor, Ont., 1—2; Somerville, Ltd., Toronto, Ont., 4; Canadian Wolverine Company, Chatham, Ont., 3; W. D. Allen Manufacturing Company, Chicago, 1—3; Acme Metal Manufacturing Company, 1; A. H. Anderson Brass Works, Chicago, 4—10; Crane Company, Chicago, 1; N. Deutsch & Company, 4; Elevator Supply and Repair Company, Chicago, 2—2; Federal-Huber Company, Chicago, 1—2—3; Findisen Kropf & Company, Chicago, 2—4—3; Hewitt Manufacturing Company, Chicago, 1—11; Liquid Carbonic Company, Chicago, 7—9; Willy H. Lau & Company, 1; Standard Metal Manufacturing Company, Chicago, 2—1; Stromberg Motor Device Company, 8; L. Wolff Manufacturing Company, Chicago, 1—4—7; Mark Manufacturing Company, Evanston, Ill., 3; Western Electric Company, Hawthorne plant, 1—4—2; Joliet Railway Supply Company, Joliet, Ill., 1; Chicago Bearing Metal Company, W. Pullman, Ill., 4; Rock Island Foundry, Rock Island, Ill., 2; Edgar Allen American Manganese Steel Company, Chicago Heights, Ill., 1; Remy Electric Company, Anderson, Ind., 5; American Steel Foundries, Indiana Harbor, Ind., 1—1; Henry Orms Sons Company, St. Paul, Minn., 1—1; Milwaukee Valve Company, Milwaukee, Wis., 1; Milwaukee Bronze Castings Company, Milwaukee, Wis., 1; Hoffman & Billings Manufacturing Company, Milwaukee, Wis., 2—2; National Electric Company, Milwaukee, Wis., 1; Aluminum Foundry Company, Manitowoc, Wis., 2—4; Frost Manufacturing Company, Kenosha, Wis., 2—1; Racine Aluminum and Brass Works, Racine, Wis., 2—1; Prier Brass Works, Kansas City, Mo., 1—3; Ferd. Messmer Manufacturing Company, St. Louis, Mo., 1—2; J. L. Mott & Company, Trenton, N. J., 1—6; Pfau Manufacturing Company, Cincinnati, O., 4; National Cash Register Company, Dayton, O., 1; Glauber Brass Works, Cleveland, O., 1—6; Lunkenheimer Company, Cincinnati, O., 2; Fries Manufacturing Company, Buffalo, N. Y., 1; Lumen Bearing Company, Buffalo, N. Y., 4—2—1; Hewitt Manufacturing Company, Topeka, Kan., 1; Davis Safe & Lock Company, Portland, Ore., 3; Clayton & Lambert Manufacturing Company, Detroit, 5—3—5; Detroit Sanitary Supply Company, 2—1; Eclipse Foundry Company, Detroit, 1—2; Sherwood Brass Works, Detroit, 1—2—10; Detroit Lubricator Company, Detroit, 1; Penberthy Injector Company, Detroit, 2—3—2; Long Manufacturing Company, Detroit, 4; Wolverine Brass Works, Grand Rapids, Mich., 4—3; Fairview Foundry Company, Detroit, 2—1—4.

This record of more than 250 furnaces sold, and most of them on repeat orders, all by one man, is a valuable testimonial as to the efficiency and saving accomplished by the Fisher furnace. About May 1, 1911, Mr. Fisher will move to 1453 W. Austin avenue, Chicago, Ill. His circular "F" is sent on request.

CATALOGUE EXHIBIT

An exhibition of every kind of catalogues may be seen at THE METAL INDUSTRY office, 99 John street, New York. THE METAL INDUSTRY is prepared to do all of the work necessary for the making of catalogues, pamphlets, circulars and other printed matter. Estimates will be furnished for writing descriptions, making engravings, printing, binding, for the entire job from beginning to end or any part of it.

INFORMATION BUREAU

Any firm intending to buy metals, machinery or supplies, and desiring the names of the various manufacturers and sellers of these products can obtain the desired information by writing to THE METAL INDUSTRY. Commercial questions are answered by return mail. Our Information Bureau is for the purpose of answering questions of all kinds. Address THE METAL INDUSTRY, 99 John street, New York.

METAL MARKET REVIEW

NEW YORK, April 10, 1911.

COPPER.

The price for Standard copper in the London market is a trifle higher than a month ago. Opening at £54 15s., and closing at £56 5s.

In the New York market prices are about ¼ cent lower than a month ago, Lake is quoted today at 12½ cents against 12¾, Electrolytic today 12¼ against 12½ and Casting brands 12½ against 12⅜. The demand from the wire makers has been very good during the month but the rest of the consumers have not been very active and there has been no snap to the market at any time during the last thirty days.

The exports for March were rather heavy, amounting to 23,300 tons, making total exports so far this year 72,149 tons against 71,900 for the same period last year.

The market is dull and tends more in buyers' favor, and unless the figures of the Copper Producers Association are more favorable than is generally expected the market is likely to continue dull and easy.

TIN.

The course of the tin prices in the London market have been a great surprise to the trade here. America has been a willing buyer all the month and the price movement in London has been most erratic, trading has been very heavy, but it has been absolutely impossible to tell from day to day how the market was going.

In the New York market the feature has been the heavy demand from consumers, the deliveries for the month are estimated as 5,100 tons, the heaviest month's consumption in the history of the trade. The policy has been to buy on the declines and consumers generally can show a good average for the month considering the violent fluctuations that have occurred in the market almost each day.

The statistics for the month show a further shrinkage in the visible supply, the total at the end of March being 16,682 tons against 17,260 tons a month ago and 20,203 tons a year ago. The total shipments from the Straits were 4,487 tons for the month and the total deliveries were 7,620 tons.

The price of spot tin today is around 41½ cents against 40 cents a month ago and against a low price during the month of March of close to 39 cents. Future tin is from 10 to 20 points below the spot price.

LEAD.

The London lead market has held steady at around £13.

In the New York market prices have ruled fairly steady at from 4.50 New York to 4.45 for carload lots. In St. Louis prices ranged from 4¼ to 4.30. The demand has not been very active, and the Trust has been undersold most of the time.

SPELTER.

The foreign market has been dull and uninteresting at around £23.

The New York spelter market has been more or less manipulated, with the help of the St. Louis market, while prices are from 10 to 15 points lower than a month ago. Carloads lots today 4.60 New York delivery against 4.75 a month ago.

The St. Louis market is quoted at 5.35 while consumers can buy at 5.32½ or perhaps lower.

ALUMINUM.

There has been hardly any change in aluminum, 5 and 10-ton lots of imported ingots 98-99 per cent. pure and quotable at 21 to 21½ cents. Small lots at 22 to 22¼ cents.

ANTIMONY.

The foreign combination have not been able to do much with the market abroad, the price today is about £1 lower at £34 for Halletts and £33 10s. for other brands.

In the New York market Cooksons has held steady at 9½ cents, but Halletts and the other grades are from ⅛ cent to ¼ lower, Halletts at 9⅛, Chinese at 8½ and Hungarian grade at 8½ to 8.35.

SILVER.

The London market for silver has been very dull and prices show very little change. Opening at around 24¼ d. and closing at 24¼ d.

In New York market has been quiet, with price movement closely following the foreign changes, closing at around 52½ cents.

QUICKSILVER.

The foreign market has been quite active with Rothschild's price up to £10, and second brands £9 15s., later Rothschild's price was reduced to £9 5s., and second brands about the same price.

The New York price has been held firm at $52 per flask for wholesale lots and from $52.50 to $53 for jobbing lots.

PLATINUM.

There has been no change in the price of platinum. Hard 10% is quoted at $43 per ounce and ordinary refined at $41. Iridium is quoted at $61 per ounce.

SHEET METALS.

The list price for wire and sheet copper is unchanged, but these list prices are being cut fully ½ cent. Wire is quotable at 13½ cents base and sheet copper at 18 cents. Brass products unchanged.

OLD METALS.

There is nothing doing in the home market, but a very good demand from abroad and dealers are selling freely at a shade under the prices lately ruling.

COPPER PRODUCTION

(Issued by the Copper Producers' Association.)

		April 8, 1911.
Stocks of marketable copper of all kinds on hand at all points in the United States, March 1, 1911....		156,637,770
Production of marketable copper in the United States from all domestic and foreign sources during March, 1911.....		130,532,080
		287,169,850
Deliveries:		
For domestic consumption.....	66,080,789	
For export	59,081,127	
		125,161,916
Stocks of marketable copper of all kinds on hand at all points in the United States, April 1, 1911..		162,007,934
Stocks increased during the month of March.....		5,370,164

MARCH MOVEMENTS IN METALS

COPPER.	Highest.	Lowest.	Average.
Lake	12.75	12.50	12.60
Electrolytic	12.50	12.25	12.35
Casting	12.40	12.10	12.25
TIN	42.60	39.15	41.00
LEAD	4.50	4.50	4.50
SPELTER	5.75	5.60	5.70
ANTIMONY (Hallett's)	9.25	9.15	9.20
SILVER	.53	.51⅜	52.22

WATERBURY AVERAGE

The average price of lake copper per pound as determined monthly at Waterbury, Conn.

1910—Average for year 13.13½. 1911—January, 12⅞; February, 12¾; March, 12½.

INQUIRIES AND OPPORTUNITIES

Under our directory of "Trade Wants" (published each month in the back advertising pages), will be found a number of inquiries and opportunities which, if followed up, are a means of securing business. Our "Trade Want Directory" fills wants of all kinds. See Want Ad. pages.

Metal Prices, April 10, 1911

NEW METALS.

	Price per lb. Cents.
COPPER—PIG, BAR AND INGOT AND OLD COPPER. Duty Free, Manufactured 2½c. per lb.	
Lake, carload lots	12.50
Electrolytic, carload lots	12.25
Casting, carload lots	12.15
TIN—Duty Free.	
Straits of Malacca, carload lots	41.50
LEAD—Duty Pigs, Bars and Old, 2½c. per lb.; pipe and sheets, 2⅜c. per lb.	
Pig lead, carload lots	4.50
SPELTER—Duty 1⅜c. per lb. Sheets, 1⅝c. per lb.	
Western carload lots	5.60
ALUMINUM—Duty Crude, 7c. per lb. Plates, sheets, bars and rods, 11c. per lb.	
Small lots	28.00
100 lb. lots	25.00
Ton lots	21.50
ANTIMONY—Duty 1½c. per lb.	
Cookson's, cask lots, nominal	9.50
Hallett's cask lots	9.15
Chinese	8.50
Hungarian grade	8.75
NICKEL—Duty Ingot, 6c. per lb. Sheet, strips and wire 35% ad valorem.	
Shot, Plaquettes, Ingots, Blocks, according to quantity	.43 to .60
MANGANESE METAL—Duty 20%	.90
MAGNESIUM METAL—Duty 3 cents per pound and 25% ad valorem (100 lb. lots)	1.50
BISMUTH—Duty free	2.10
CADMIUM—Duty free	.80
CHROMIUM METAL—Duty 25% ad val	.98
	Price per oz.
GOLD—Duty free	$20.67
SILVER—Duty free	.52½
PLATINUM—Duty free	41.00
QUICKSILVER—Duty 7c. per lb. Price per pound 74 to	.75

OLD METALS.

Dealers' Buying Prices. Cents per lb.		Dealers' Selling Prices. Cents per lb.
10.75 to 11.00	Heavy Cut Copper	11.75 to 12.00
10.50 to 10.75	Copper Wire	11.50 to 11.75
9.75 to 10.00	Light Copper	10.75 to 11.00
9.25 to 9.50	Heavy Mach. Comp.	10.50 to 10.75
7.00 to 7.25	Heavy Brass	8.00 to 8.25
5.50 to 5.75	Light Brass	6.75 to 7.00
7.00 to 7.25	No. 1 Yellow Brass Turnings	8.00 to 8.25
8.00 to 8.25	No. 1 Comp. Turnings	9.00 to 9.25
3.90 to 4.00	Heavy Lead	—— to 4.25
3.75 to 3.90	Zinc Scrap	—— to 4.25
5.00 to 5.50	Scrap Aluminum, turnings	5.00 to 6.50
10.00 to 12.00	Scrap Aluminum, cast, alloyed	11.00 to 13.00
14.00 to 15.00	Scrap Aluminum, sheet (new)	16.00 to 17.50
23.00 to 24.00	No. 1 Pewter	25.00 to 26.00
25.00 to 27.00	Old Nickel	28.00 to 30.00

INGOT METALS.

	Price per lb. Cents.
Silicon Copper, 10% to 20%..according to quantity	28 to 35
Silicon Copper, 30% guaranteed " "	38
Phosphor Copper, 5% " "	19 to 21
Phosphor Copper, 10% to 15%, guaranteed " "	28 to 30
Manganese Copper, 30% " "	30 to 35
Phosphor Tin " "	34 to 36
Brass Ingot, Yellow " "	8½ to 9½
Brass Ingot, Red " "	11 to 12½
Bronze Ingot " "	10 to 11
Manganese Bronze " "	17 to 19
Phosphor Bronze " "	13 to 16
Casting Aluminum Alloys " "	29 to 35
PHOSPHORUS—Duty 18c. per lb. According to quantity	30 to 35

PRICES OF SHEET COPPER.

BASE PRICE, 18 Cents per Lb. Net.

PRICES MENTIONED BELOW ARE FOR QUANTITIES OF 100 LBS. AND OVER.

SIZE OF SHEETS.		64 oz. and over 50 lb. sheet 30 x 60 and heavier.	32 oz. to 64 oz. 25 to 50 lbs. sheet 30 x 60.	24 oz. to 32 oz. 18¾ to 25 lb. sheet 30 x 60.	16 oz. to 24 oz. 12½ to 18¾ lb. sheet 30 x 60.	14 oz. and 15 oz. 11 to 12½ lb. sheet 30 x 60.	12 oz. and 13 oz. 9½ to 11 lb. sheet 30 x 60.	10 oz. and 11 oz. 7¾ to 9½ lb. sheet 30 x 60.	8 oz. and 9 oz. 6¼ to 7¾ lb. sheet 30 x 60.	Lighter than 8 oz.
		Cents Per Pound Over Base Price for Soft Copper.								
Not wider than 30 ins.	Not longer than 72 inches.	Base	Base	Base	Base	1	2	3	6	9
	Longer than 72 inches. Not longer than 96 inches.	"	"	"	"	1	3	6	9	
	Longer than 96 inches.	"	"	"	"	2	6			
Wider than 30 ins. but not wider than 36 inches.	Not longer than 72 inches.	"	"	"	"	2	4	7	10	
	Longer than 72 inches. Not longer than 96 inches.	"	"	"	"	2	6	9		
	Longer than 96 inches. Not longer than 120 inches.	"	"	"	1	3				
	Longer than 120 inches.	"	"	1	2					
Wider than 36 ins. but not wider than 48 inches.	Not longer than 72 inches.	"	"	1	2	4	7	10		
	Longer than 72 inches. Not longer than 96 inches.	"	"	1	3	5	8			
	Longer than 96 inches. Not longer than 120 inches.	"	"	2	4	8				
	Longer than 120 inches.	"	1	3	6					
Wider than 48 ins. but not wider than 60 inches.	Not longer than 72 inches.	"	Base	1	3	6	11			
	Longer than 72 inches. Not longer than 96 inches.	"	"	2	4	9				
	Longer than 96 inches. Not longer than 120 inches.	"	1	3	6					
	Longer than 120 inches.	1	2	4	8					
Wider than 60 ins. but not wider than 72 ins.	Not longer than 96 inches.	Base	1	3	8					
	Longer than 96 inches. Not longer than 120 inches.	"	2	5	10					
	Longer than 120 inches.	1	3	8						
Wider than 72 ins. but not wider than 108 ins.	Not longer than 96 inches.	1	3	6						
	Longer than 96 inches. Not longer than 120 inches.	2	4	7						
	Longer than 120 inches.	3	5	9						
Wider than 108 ins.	Not longer than 132 inches.	4	6							
	Longer than 132 inches.	5	8							

The longest dimension in any sheet shall be considered at its length.

CIRCLES, SEGMENTS AND PATTERN SHEETS, advance over prices of Sheet Copper required to cut them from 3 cents per pound.

COLD OR HARD ROLLED COPPER, 14 oz. per square foot, and heavier, add 1 " " "

COLD OR HARD ROLLED COPPER, lighter than 14 oz., per square foot, add 2 " " "

POLISHED COPPER, 20 INCHES WIDE and under, advance over price for Cold Rolled Copper of corresponding dimensions and thickness 1 " " sq. ft.

POLISHED COPPER, WIDER THAN 20 INCHES, advance over price for Cold Rolled Copper of corresponding dimensions and thickness 2 " " " "

COLD ROLLED COPPER, PREPARED SUITABLE FOR POLISHING, same as Polished Copper of corresponding dimensions and thickness.

COLD ROLLED AND ANNEALED COPPER SHEETS OR CIRCLES, same price as Cold or Hard Rolled Copper of corresponding dimensions and thickness.

ROUND COPPER ROD, ⅜ inch diameter or over.....Base Price.

(Rectangular, Square and Irregular Shapes, Copper Rod, Special Prices.)

	Cents per lb.
ZINC—Duty, sheet, 1½c. per lb.	
Carload lots, standard sizes and gauges, at mill	7.50 less 8%
Casks, jobbers' prices	8.00
Open casks, jobbers' prices	8.50

Metal Prices, April 10, 1911

PRICES ON BRASS MATERIAL—MILL SHIPMENTS,

In effect Jan. 30, 1911, and until further notice.

To customers who purchase less than 40,000 lbs. per year and over 5,000 lbs. per year.

	Net base per lb. High Brass.	Low Brass.	Bronze.
Sheet	$0.13¼	$0.14⅜	$0.15⅝
Wire	.13¼	.14⅜	.15⅜
Rod	.13¼	.15⅜	.16⅜
Brazed tubing	.18⅝	—	.20¼
Open seam tubing	.16⅜	—	.18¼
Angles and channels, plain	.16⅜	—	.18¼

50% discount from all extras as shown in American Brass Manufacturers' Price List No. 8.

NET EXTRAS FOR QUALITY.

Sheet—Extra spring drawing and spinning brass	½c.	per lb. net advance
" —Best spring, drawing and spinning brass	1½c.	" " " "
Wire—Extra spring and brazing wire	½c.	" " " "
" —Best spring and brazing wire	1c.	" " " "

To customers who purchase less than 5,000 lbs. per year.

	Net base per lb. High Brass.	Low Brass.	Bronze.
Sheet	$0.14¼	$0.15⅛	$0.17¾
Wire	.14¼	.15⅛	.18¾
Rod	.14¼	.16⅜	.19¾
Brazed tubing	.19⅝	—	.21½
Open seam tubing	.17⅝	—	.19½
Angles and channels, plain	.17⅝	—	.19½

5% discount from all extras as shown in American Brass Manufacturers' Price List No. 8.

NET EXTRAS FOR QUALITY.

Sheet—Extra spring drawing and spinning brass	½c.	per lb. net advance
" —Best spring, drawing and spinning brass	1½c.	" " " "
Wire—Extra spring and brazing wire	½c.	" " " "
" —Best spring and brazing wire	1c.	" " " "

BARE COPPER WIRE—CARLOAD LOTS.

13.75c. per lb. base.

SOLDERING COPPERS.

300 lbs. and over in one order	18½c. per lb. base
100 lbs. to 300 lbs. in one order	19c. " " "
Less than 100 lbs. in one order	20½c. " " "

PRICES FOR SEAMLESS BRASS TUBING.

From 1¼ to 3½ in O. D. Nos. 4 to 13 Stubs' Gauge, 18c. per lb.
Seamless Copper Tubing, 21c. per lb.

For other sizes see Manufacturers' List.

PRICES FOR SEAMLESS BRASS TUBING Iron Pipe Sizes.

Iron pipe Size	⅛	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4	4½	5	6
Price per lb.	26	25	20	19	18	18	18	18	18	18	18	19	20	22	24	25

PRICE LIST OF IRON LINED TUBING—NOT POLISHED.

	Per 100 feet Brass.	Bronze.
⅜ inch	$8	$9
½ inch	8	9
⅝ inch	10	11
¾ inch	12	13
⅞ inch	14	15
1 inch	18	20
1⅛ inch	22	24
1¼ inch	25	27
1½ inch	32	35
1¾ inch	45	48
2 inch	56	60

Discount 55 and 5%.

PRICES FOR MUNTZ'S METAL AND TOBIN BRONZE.

Muntz's or Yellow Metal Sheathing (14" x 48")	14c.	net base
" " " Rectangular sheets other than Sheathing	16c.	" "
" " " Rod	14c.	" "
Tobin Bronze Rod	16c.	" "

Above are for 100 lbs. or more in one order.

PLATERS' METALS.

Platers' bar in the rough, 22¼c. net.

German silver platers' bars dependent on the percentage of nickel, quantity and general character of the order.

Platers' metal, so called, is very thin metal not made by the larger mills and for which prices are quoted on application to the manufacturers.

PRICES FOR SHEET BLOCK TIN AND BRITANNIA METAL.

Not over 18 in. in width, not thinner than 23 B. S. Gauge, 2c. above price of pig tin in same quantity.

Not over 35 in. in width, not thinner than 22 B. S. Gauge, 3c. above price of pig tin.

PRICE SHEET FOR SHEET ALUMINUM—B. & S. Gauge.

	Wider than..... and including.....	31in. 12in.	6in. 14in.	14in. 16in.	16in. 18in.	18in. 20in.	20in. 24in.	24in. 30in.	30in. 36in.	36in. 40in.
		in coils.								
No. 13 and heavier		34	34	36	36	36	36	39	39	39
" 14		34	34	36	36	36	36	39	39	39
" 15		34	34	36	36	36	36	39	39	39
" 16		34	34	36	36	36	36	39	39	39
" 17		34	34	36	36	36	36	39	39	39
" 18		34	34	36	36	36	36	39	39	42
" 19		34	34	36	36	36	36	39	40	43
" 20		34	36	36	36	36	38	41	42	44
" 21		34	38	38	38	38	40	43	44	50
" 22		34	38	38	38	40	40	43	47	51
" 23		34	38	38	38	40	40	43	49	52
" 24		34	38	40	42	42	42	45	51	54
" 25		36	39	41	43	43	43	46	53	57
" 26		36	39	42	46	46	46	51	55	61
" 27		36	40	44	48	48	49	54	58	64
" 28		36	40	46	48	49	49	56	62	67
" 29		38	41	48	50	52	52	61	67	72
" 30		38	42	50	52	56	62	69	72	77
" 31		43	47	55	58	63	71	74	77	83
" 32		45	49	57	61	69	77	91	90	95
" 33		47	51	60	65	73	84	91	100	110
" 34		50	55	62	70	78	91	103	110	120
" 35		..	65	70	80	90	100	115	125	..
" 36		..	80	90	100	115	120	135	..	..
" 37		..	104	114	129	144	159	174	..	..
" 38		..	124	139	154	169	184	204	..	..
" 39		..	144	164	184	204	224	..	..	..
" 40		..	174	204	224	244	..	..	..	..

In flat rolled sheets the above prices refer to lengths between 2 and 9 feet. Prices furnished by the manufacturers for wider and narrower sheet. All columns except the first refer to flat rolled sheet. Prices are 100 lbs. or more at one time. Less quantities 5c. lb. extra. Charges made for boxing.

PRICE LIST SEAMLESS ALUMINUM TUBING.

STUBS' GAUGE THE STANDARD. SIZES CARRIED IN STOCK.
Outside Diameters. BASE PRICE, 25 Cents per Pound.

Stubs' Gauge.	Inches.	⅛ in.	5-16 in.	⅜ in.	½ in.	⅝ in.	¾ in.	⅞ in.	1 in.	1¼ in.	1½ in.	1¾ in.	2 ins.	2½ ins.	3 ins.	3½ ins.	4 ins.	4½ ins.
11.	.120.	..	..	..	..	..	..	..	27	24	..	..	14	20	10	9	16	23
12.	.100.	..	..	..	..	..	..	..	26	..	..	..	15	..	..	..	..	..
14.	.083.	..	..	..	..	..	..	..	..	..	..	..	17	..	..	..	..	..
16.	.065.	..	..	..	..	..	28	27	27	24	23	21	21	21	21	27	31	37
18.	.049.	..	..	..	..	33	30	29	28	25	26	26	26	..	..	..	..	..
20.	.035.	117	..	46	39	34	33	32	30	29	30	30	30	31	38	49	58	81
21.	.032.	..	..	..	40	..	..	..	..	..	..	..	..	..	..	..	..	..
22.	.028.	138	98	48	42	38	37	35	34	..	..	45	..	..	..	..	..	..
24.	.022.	188	133	108	88	79	73	62	60	66	..	..	..	..	..	..	..	..

Prices are for ten or more pounds at one time. For prices on sizes not carried in stock send for Manufacturers' List.

PRICE LIST FOR ALUMINUM ROD AND WIRE.

Diameter. B. & S. G'ge.	000 to No. 10.	No. 11.	No. 12.	No. 13.	No. 14.	No. 15.	No. 16.	No. 17.	No. 18.	No. 19.	No. 20.	No. 21.	No. 22.
Price, per lb....	32	32½	32½	33	33½	34	34½	35	36	37	38	43	46

PRICE LIST FOR GERMAN SILVER IN SHEETS AND ROLLS.

Per cent.	Price per lb.	Per cent.	Price per lb.
12	$0.52	16	$0.58
13	.53	17	.59
14	.54	18	.60
15	.55		

These prices are for sheets and rolls over 2 inches in width, to and including 8 inches in width and to No. 20, inclusive. American or Brown & Sharpe's Gauge. Prices are for 100 lbs. or more of one size and gauge in one order. Discount 50%.

GERMAN SILVER TUBING.

4 per cent.	to No. 19, B. & S. Gauge, inclusive				$0.60
6 "	" " 19, " " "				.70
9 "	" " 19, " " "				.85
12 "	" " 19, " " "				1.00
15 "	" " 19, " " "				1.15
16 "	" " 19, " " "				1.20
18 "	" " 19, " " "				1.30

German Silver Tubing thinner than No. 19 B. & S. Gauge add same advances as for Brazed Brass Tube.

For cutting to special lengths add same advances as for Brazed Brass Tube. Discount 40%.

PRICES OF SHEET SILVER.

Rolled sterling silver .925 fine is sold according to gauge quantity and market conditions No fixed quotations can be given, as prices range from 2c. below to 6c. above the price of bullion.

Rolled silver anodes .999 fine are quoted at 2c. to 3½c. above the price of bullion.

ALUMINUM COMPANY OF AMERICA

PITTSBURGH, PA.

ALUMINUM

SHEET TUBING
EXTRUDED SHAPES
ROD RIVETS WIRE
ELECTRICAL CONDUCTORS

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CHICAGO—Old Colony Bldg.
PITTSBURGH—2344 Oliver Bldg.
PHILADELPHIA—320 Witherspoon Bldg.
ROCHESTER—406 Powers Block
CLEVELAND—719 Garfield Bldg.
WASHINGTON—514 Nat. Met. Bk. Bldg.
DETROIT—1515 Ford Bldg.

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Our Ingot is prepared by the most up-to-date methods, which insures good, free-flowing metal. Send us your specifications and we will quote you prices which are sufficiently below the cost of making the same composition from new metals, that a material saving can be effected. We are in position to do this, as we have our own smelters. Our Ingots are guaranteed subject to chemical analysis within 1% either way of aimed-at formula.

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Allan Bronze

Lead-Copper-Tin bearing alloys, prepared by the Allan Process which controls the lead content. They need no stirring when casting to assist in keeping the lead from segregating.

They produce homogeneous and fine-grained castings with low coefficient of friction, combined with high compressive and tensile strength.

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New York

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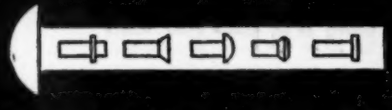

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IRON, BRASS, COPPER
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AND
PLATED IN ANY FINISH
HAVE MADE THEM SINCE 1850

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CLAY & OAKLAND STREETS,
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CHROMAX BRONZE

PATENTED

The best bronze for bearings, gears, etc. Possesses a very oily nature, acid proof, non-corosive, and being of an oily nature it does not have the same tendency to cut shaft when heated.
All kinds of brass and aluminum castings.
Brazing solder of all kinds.

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You Will Find it in

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RED INGOT

40% New Metal Used in its Manufacture

Made under CHEMICAL SUPERVISION. It has a uniform composition. Its only substitute—SCRAP BRASS has not.

It is Guaranteed.

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DETROIT, MICHIGAN

The FIRST Platinum Works in the United States
FOUNDED 1842

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For any purpose

CHEMICAL APPARATUS
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SHEET
WIRE
FOIL

Platinum Alloys, Salts and Solutions

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MALVERN, PA. U. S. A.

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Progressive Manufacturers

of Metal Goods, such as hollow-ware, brush, comb and mirror backs; trays, novelties, badges, medals, etc., can find many profitable uses for our

BRITANNIA METAL

which for many purposes is better than brass, copper or German silver. **Britannia Metal** does not corrode or tarnish. It stays white in places where even German silver turns yellow. It is easily plated with any desired finish. It is easily worked and needs no annealing. It necessitates only inexpensive cast bronze dies, which wear long, seldom break and have a high scrap value when worn out. Though soft, **Britannia Metal** holds its shape prefectly after being formed. It is easily soldered. We re-roll **Britannia Metal** scrap at a nominal charge, or will purchase it outright from you. These advantages should induce you to write for quotations to

STANDARD ROLLING MILLS INC.
363 Hudson Avenue Brooklyn, N. Y.

WHEW!!
LOOK AT TIN!!

NOW is the time to order
100 pounds of

BASSITE

and find out just what it will do for you toward saving 40% of the price of tin. You have the strength and quality test reports, or we will send them on application.

BUT ORDER NOW

The Bassite Smelting & Mfg. Co., Inc.
Cincinnati and Milford, Ohio, U.S.A.

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ALUMINUM SOLDER

IS THE ONLY REAL RELIABLE
ALUMINUM SOLDER
A SAMPLE ORDER WILL PROVE IT

JANNEY, STEINMETZ & CO.
PHILADELPHIA, PA.

Aluminum Solder No Flux
Mass. Institute of Technology, test 11,090 lbs. per sq. inch at soldered joint
WE HAVE THE STRENGTH

$100 REWARD
FOR ANY BROKEN PIECE OF ALUMINUM WE FAIL TO REPAIR SATISFACTORILY WITH OUR SOLDER

Solder $3.00 per lb. Sample Sticks $1.00
We have repaired tons of Aluminum

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AGENTS WANTED
N. Y. AGENCY
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REINHOLD "NOFLUX" ALUMINUM SOLDER

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$2.80 PER POUND

For Trade Discount Apply to Your Jobber or to

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53 DEMAREST STREET, NEWARK, NEW JERSEY

CUPROR

TRADE MARK

The new metal that looks like gold and wears like steel. *Absolutely won't corrode.* Resists the action of the atmosphere, salt air and salt water. *Color and lustre permanent.* Great strength, toughness and ductility. *The easiest metal to work known.* Can be had either soft or of hard spring temper. For fittings of all kinds. *No lacquer required. Easily cleaned with soap and water.* Some of its principal uses are: for jewelry, bedsteads, automobile fittings, ship's fittings, building hardware, furniture trimmings, railroad car fittings, lamps, lavatory fittings, chandeliers, etc. In ingots, sheet, wire, tubing and rods.

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Cables, Pamphlet, New York

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SWEEPINGS

Our Magnetic Separator will handle more material and make a cleaner separation than any other.

The Iron will not contain so much brass.

Write Dept. A.

AMERICAN CONCENTRATOR COMPANY

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Philadelphia, Pa. Weightman Bldg.
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The One Great Advance in the Soldering Industry

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SOLDERING FLUID

NO ACID NO FUMES NO RUST

Saves the Health of the Metal Worker
No injury to eyes, nose or throat
The Fluid that displaced rosin for roofing

Single gallons 80 cents at any jobber's. Quotations on quantity. Free samples sent to responsible metal workers on request. Write Dept. A. S. P.

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THE ALFRED SPICE PROCESS
MANUFACTURING CHEMISTS,
250 North Fifth Street, PHILADELPHIA, PA.

ALUMINUM COMPANY OF AMERICA

Pittsburgh, Pa.

Ingot ALUMINUM Alloys

Prices on Application

VIRGIN METALS

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TIN—LEAD—ZINC—ANTIMONY

ALLOYS

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U. S. REDUCTION COMPANY, CHICAGO

STANDARD QUALITY **ALUMINUM** 99% MINIMUM GUARANTEED

SOLE AGENTS FOR ALL FRENCH PRODUCERS

High Grade MANGANESE-COPPER Free From Iron

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Orders taken for future shipment from Europe or immediate shipment from stock in New York. Correspondence solicited.

Guiterman, Rosenfeld & Company, 35 South William St., New York

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Bronze Liquid for Mixing the Powder
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Manufacturers of
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Importers and Dealers in
INGOT COPPER, BLOCK TIN,
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Scovill Mfg. Co.
WATERBURY, CONN.
BRASS ROLLING MILLS
WIRE MILLS
FACTORIES for the manufacture of various articles made of brass or German Silver.
DEPOTS:
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General Offices, Mills and Factories
WATERBURY, CONN.
NEW YORK OFFICE, 99 JOHN STREET.
Providence (R. I.) Store, 131 Dorrance St.
Shipments Upon Receipt of Order from Large Stock of
SEAMLESS DRAWN BRASS AND COPPER TUBING
BRASS { SHEET ROD WIRE COPPER { SHEET ROD WIRE
GERMAN SILVER { SHEET ROD WIRE
At Waterbury

NON-CORROSIVE FINEST QUALITY
Copper and Yellow
(MUNTZ) METAL
NAVAL BRASS
NAVAL BRONZE
MANGANESE BRONZE
PLATES, SHEETS, BOLTS, BARS, RODS, NAILS, TACKS, ETC.
Taunton-New Bedford Copper Co.
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Manufacturers of
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In Sheets, Plates, Rolls
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BRAZED BRASS TUBING
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Manufacturers BRIDGEPORT, CONN.

BRASS and COPPER
in Sheets and Rolls
SILVER PLATED METAL
(for Coach Lamps)
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LINING METAL
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SEYMOUR, CONN.
German Silver
Brass, Copper and Bronze in Sheets, Wire, Rods and Tubes
COPPER AND NICKEL ANODES
Phosphor Bronze

A. H. Wells & Co.
WATERBURY, CONN.
Manufacturers of
SEAMLESS... NICKEL SILVER, BRASS, COPPER, BRONZE AND PURE COPPER **Tubing**
TUBING FOR ELECTRICAL PURPOSES
Odd and Special Shapes, and Small Tubing a Specialty
—Also the—
BOURDON STEAM GAUGE SPRINGS
All Sizes from 8 to 36, B. & S. Gauge.

"RIVERSIDE"
GERMAN SILVER
PHOSPHOR BRONZE
Sheets, Rods, Wire, Ingots, Castings, Jewelers' Bars and Alloys.
The
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Riverside, Burlington Co., N. J.

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Manufacturers of
BRASS and BRONZE in Sheet, Rod Wire, Tube, Moulding, etc. METAL GOODS made to order from Brass, Bronze and Copper.

BUFFALO COPPER AND BRASS ROLLING MILL
Military Road and Hertel Avenue
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METAL ROLLING MILLS.

INGOT, PLATE, SHEET, ROD, WIRE, TUBE, METAL GOODS.

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Manufacturers of
BRASS and COPPER Sheets, Tubes
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Sole Manufacturers TOBIN BRONZE
(Trade-Mark Registered)

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Manufacturers of
ROLLED BRASS, BRONZE, GERMAN SILVER AND COPPER IN THIN GAUGES. PLATERS' METAL.

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Manufacturers of
Brass and Bronze Iron Lined Tubes
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Main Office and Mills: Brooklyn, N. Y. City Branch Offices: Chicago, San Francisco

SEAMLESS STEEL TUBING
From 4 in. Diameter to 1-64 in.
Finished Bright, Smooth and Accurate to 1-1000 Ins. Inside and Out
Tool Steel Tubing. Soft Steel Tubing. Also Small Brass, Copper and Aluminum Tubing.
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Rollers of Silver Anodes and Sterling Silver
ALSO DEALERS IN
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Long Distance Phone 3759 R.

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BROOKLYN, N. Y.
(*See advertisement, page 35*)

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MANUFACTURERS OF
Gold Solder
SHEET OR WIRE
Silver Solder
SHEET OR WIRE
Sheet Brass Solder

Established 1859. Telephone connection.
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BRITANNIA METAL. ANTIMONIAL LEAD.
SHEET BLOCK TIN
CASTING, ROLLING AND REFINING.
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ROCHELLE PARK, N. J.

Rolled Fireless Sterling Silver
SILVER SOLDERS, ANODE SILVER and SILVER WIRE
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SMELTERS of SPELTER
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SHEET ZINC and SULPHURIC ACID
Zincs for Leclanche Battery
Special Sizes of Zinc to order. Rolled Battery Plates. Selected Plates for Etchers' and Lithographers' use. Selected Sheets for Paper and Card Makers' use. Stove and Washboard Blanks.

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THE ORIGINAL BRAND OF PURE SPELTER
Indispensable in the manufacture of
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The New Jersey Zinc Co.
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Smelters of
HIGH GRADE SPELTER AND PIG LEAD
Chemical Department
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Works: Sandoval and East St. Louis, Illinois.

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IN COILS FOR DRAWING and STAMPING
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HEAVY COPPER AND WIRE, Ready for the Crucible
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are caused by the gases absorbed in the melting, and our Magnesium is the best Agent for the elimination of the said gases, thus removing the CAUSE of "blow-holes," and furnishing the means for production of First-Class Castings.

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Metal Polishing and Electro Plating

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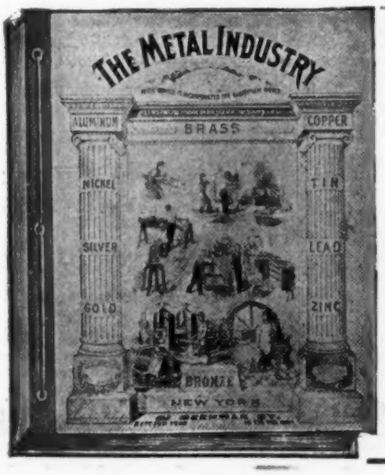

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METALS, MACHINERY AND SUPPLIES

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The exclusive rights to manufacture and sell a patented machine that greatly reduces foundry costs. This is an established business; the machines are in use in a number of prominent foundries, and there is an excellent opportunity for extension. Address B. R., care "The Metal Industry."

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Old Material of all Kinds Purchased

FOR SALE—A No. 2 Type M DINGS SEPARATOR FOR BRASS FOUNDRY use. We guarantee the machine to be in perfect condition, and if taken at once can be bought for $145. Factory price, $250. For full information, address MILWAUKEE EQUIPMENT COMPANY, Milwaukee, Wis.

FOR SALE—The metal working machinery used in the factory of the Manhattan Screw & Stamping Works. THOMAS A. PAINTER, West End avenue and 67th street, New York.

FOR SALE—11,000 lbs. SEAMLESS COPPER TUBES, 7/16 in. to 2¼ ins. O. D.; various gauges and lengths. Address L. LAPAT, INC., Erie street and Erie Railroad, Paterson, N. J.

FOR SALE—One 32-inch 300-lb. capacity SCHWARTZ FURNACE in A-1 condition. Address PENBERTHY INJECTOR COMPANY, Detroit, Mich.

J. P. FANNING, machinist, 678 Jefferson avenue, Brooklyn, N. Y.—Maker of Moulds for Casting Solder, Babbitt Metal, Bar Lead, etc. We also manufacture small work. Write for particulars.

PLANTS

FOR SALE—Small METAL MELTING PLANT adapted for experimental work on ALLOYS of COPPER, NICKEL, etc. Absolute privacy. Maximum furnace capacity, 35 crucible. Location, Jersey City, N. J. Monthly rent, $4. Make offer. Address JERSEY CITY, care THE METAL INDUSTRY.

FOR SALE OR LEASE—BRASS AND ALUMINUM FOUNDRY in Indianapolis, Ind. Thoroughly modern in equipment and appliances. Did a business in its last year of nearly $200,000.00. Second largest automobile center in United States. Nearly thirty auto factories in city and vicinity. Great quantities of brass and aluminum castings required here and within a radius of one hundred miles. Present owner engaged in other business requiring his time. Address F. E. JANES, care F. E. JANES COAL & GRAIN COMPANY, INDIANAPOLIS, IND.

FOR SALE.—BRASS FOUNDRY in Brooklyn, N. Y., fully equipped and running at the present time. Good line of paying business. Owner engaged in other business requiring his time. Address J. W. C., care THE METAL INDUSTRY.

FOR SALE—PLATING and POLISHING SHOP, the only one in city. At the present time doing good business. Reason for selling, other business. Cheap to quick buyer. Address PLATING SHOP, care THE METAL INDUSTRY.

FOR SALE—A fully equipped ELECTRO-PLATING PLANT in large western city. Established four years. Profits from $175 to $200 per month. Price $2,000 if taken at once. Terms $1,200 down, balance to suit buyer. Reason for selling, death of owner. Address H. B. B., care THE METAL INDUSTRY.

FOR SALE—ELECTRO-PLATING PLANT doing a good business in the heart of the city of Boston. Good reasons for selling. WINTHROP PLATING COMPANY, 34 Beach street, Boston, Mass.

FOR SALE—Good paying BRASS MANUFACTURING ORNAMENTAL METAL and PLATING WORKS; fully equipped; long lease; cheap rent; established thirty years; wants to sell on account of sickness; will sacrifice for $9,000, at least half cash. Address BOX 1, care THE METAL INDUSTRY.

BOOK

Foundry foremen and managers wishing to know the secrets of metal mixing, also cost and loss system, send for the book "THE METAL MIXER," written by an expert. Price, $1.00. Address, A. DEVINE, 121 E. Patterson Avenue, Columbus, Ohio.

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ALWAYS READY TO BUY

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BELTING — DYNAMOS — MOTORS

WANTED—A 10 h. p. UPRIGHT BOILER. Must be in good condition and at low cost. Address S-1, care THE METAL INDUSTRY.

WANTED—Second-hand 6 or 8 h. p. horizontal engine and boiler. State what make, condition and price. Address HORIZONTAL, care THE METAL INDUSTRY.

WANTED—A copy of THE METAL INDUSTRY for February, 1905. Address FEBRUARY, care THE METAL INDUSTRY.

BUSINESS OPPORTUNITIES

I HAVE UP-TO-DATE FACTORY BUILDINGS covering about 30,000 square feet of ground, railroad siding, modern economical power, electric lighting and steam heating plants, all situated on a portion of my four acres of ground which has CITY ADVANTAGES and COUNTY TAXES. The location is an Eastern seaport town. The factory is equipped with modern brass-finishing machinery, nickel-plating plant, etc. As I am about to establish a Plumbers' Brass Goods Manufactory, I desire a partner who understands the plumbers' brass goods manufacturing business in all its branches who can contribute $15,000 (more or less) in cash. Besides the above-mentioned factory buildings, land, machinery, etc., I shall invest $15,000 (more or less) in cash, thus giving the association $15,000 cash working capital. Non-union brass working labor, in all its branches, is plentiful in our city at wages about 15 per cent. less than in similar large cities in the United States. Applicant please reply with full particulars, stating past experience. Do not answer unless you mean business. All correspondence strictly confidential, and will be returned if desired. Address FACTORY, care THE METAL INDUSTRY.

INQUIRIES

Inquiries received by THE METAL INDUSTRY for Metals, Machinery and Supplies. Further particulars may be obtained by addressing the inquiry number, care THE METAL INDUSTRY. No charge for inserting these inquiries.

Inquiry No. 286—We would like to correspond with the buyers of tin oxide in large or small quantities.

Inquiry No. 287—We would like to correspond with some manufacturers of copper sheets and brass sheets, polished, hard-rolled and ordinary (10—30 Bwg).

Inquiry No. 288—I would like to correspond with firms relative to eyelet machines.

Inquiry No. 289—We would like to correspond with firms who can furnish us with heavy stamping brass moldings. These moldings are used for making fixture bands, rings, borders, etc.

Inquiry No. 290—I would like to correspond with firms who can furnish a die for cutting out letters, etc., for signs, the iron being about 16 gauge.

Inquiry No. 291—We are installing a galvanizing plant and need a pyrometer to aid us in regulating the temperature of the metal. We would appreciate catalogues and full particulars from the manufacturers of pyrometers.

Inquiry No. 292—We would like to correspond with firms who install hot-dip galvanizing solutions.

Inquiry No. 293—We would like to correspond with the manufacturers of machines for polishing tin plates.

Inquiry No. 294—We wish to purchase a large quantity of spun brass ink-well covers. We would like to hear from the leading firms in the brass spinning line.

Inquiry No. 295—We would like to correspond with firms who make small metal statues of animals and other articles.

Inquiry No. 296—I am in the market for a small preheating furnace, to be used for preheating automobile cylinders, crank cases, etc.

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SITUATIONS OPEN

ROLLING MILL SUPERINTENDENT

WANTED—MANAGING SUPERINTENDENT to take charge of a ROLLING MILL manufacturing COPPER AND BRASS SHEETS, TUBES and RODS. This job offers a splendid opportunity for a competent man. For particulars, apply J. F. BROWN, 185 Yonge street, Toronto, Ont., Canada.

EXECUTIVE

WANTED—Young man about 25-30 years old to take charge of QUOTATION DEPARTMENT in office of MANUFACTURER of PLUMBERS' BRASS GOODS. Familiarity with costs is absolutely necessary. Give full particulars regarding experience, references, salary, etc. Replies treated confidentially. Address PLUMBERS' BRASS, care THE METAL INDUSTRY.

SALESMAN

WANTED—An experienced SALESMAN with an established trade to sell several well-known grades of BABBITT METALS; territory unlimited. Address M-7, care THE METAL INDUSTRY.

FOUNDERS

WANTED—A first-class BRASS FOUNDRY FOREMAN to take charge of a new MODERN BRASS FOUNDRY making a full line of Steam and Water Goods. Foundry equipped with Sand Handling Machinery, Molding Machines and Schwartz Melting Furnaces. Factory located in Western Pennsylvania. State age and experience. Address MODERN BRASS, care THE METAL INDUSTRY.

DIE CASTER

WANTED—A MANAGING SUPERINTENDENT capable of taking complete charge of a DIE CASTING PLANT in CANADA, preferably one who can become interested financially and act as director. Address CANADA MANAGER, care THE METAL INDUSTRY.

MOLD MAKER

WANTED—Competent man to design and make METAL MOLDS, such as are used in the manufacture of casket hardware. State age, experience and salary expected. Address METAL MOLDS, care THE METAL INDUSTRY.

MACHINIST

WANTED—A good man to take charge of our MACHINE ROOM. One that can handle help and who is practical in the PLUMBERS' SUPPLY line (the manufacturing of plumbers' supplies). For full particulars, address PLUMBERS' SUPPLY, care THE METAL INDUSTRY.

SHEET METAL WORKER

WANTED—FOREMAN for SHEET METAL DEPARTMENT. Well established automobile concern; for making fenders, tanks, radiators, etc. Excellent opportunity for first-class man. Address D-2, care THE METAL INDUSTRY.

NAME PLATE ETCHER

WANTED—A man who thoroughly understands NAME PLATE ETCHING in all its details. We have an opening for a first-class man. Address NAME PLATE, care THE METAL INDUSTRY.

GALVANIZER

WANTED—Experienced FOREMAN for GALVANIZING SHOP doing job work. Must be sober and industrious. State experience and wages expected. Address WITT CORNICE CO., Cincinnati, Ohio.

PLATERS AND POLISHERS

WANTED—A SILVER PLATER. Must be familiar with silvering, polishing and buffing headlight reflectors. Address C. H. S., care THE METAL INDUSTRY.

WANTED—PLATER, competent to take charge of plating department. Must be up to date on all SILVER and GOLD SOLUTIONS, understand how to get all up-to-date finishes, and turn out clean work on German silver, toilet sets and cheap jewelry. Address M-6, care THE METAL INDUSTRY.

WANTED—A PRACTICAL PLATER who thoroughly understands SILVER DEPOSIT business in all its branches. First-class opening for a competent man. With answers give full particulars, references, wages expected. Address D-3, care THE METAL INDUSTRY.

SITUATIONS WANTED

Advertisements Under This Heading 50 Cents Each Insertion.

EXECUTIVE

SITUATION WANTED—As EXECUTIVE, ORGANIZER, COSTS and BUYING EXPERT. Several years with one of the largest hardware manufacturers in the world. Educated at Yale University, 31 years old. Has personal acquaintance with a large proportion of the Eastern trade, particularly along practical lines. For full particulars address F-9, care THE METAL INDUSTRY.

SITUATION WANTED—As SUPERINTENDENT or GENERAL FOREMAN in a brass manufacturing establishment. Automobile, steam, and the general line of brass goods. Able to obtain results. Twenty years' experience. Address GENERAL FOREMAN, care THE METAL INDUSTRY.

SITUATION WANTED—As MANAGER or SUPERINTENDENT. Energetic, aggressive, experienced in manufacture of PLUMBERS' BRASS work, valves, etc. Can handle help and get the work out. Modern methods, interchangeable parts, technical education. Address S-6, care THE METAL INDUSTRY.

SITUATION WANTED—BRASS FOUNDRY SUPERINTENDENT or FOREMAN. Thoroughly experienced on ALUMINUM CASTINGS for automobiles, valve, pump and general jobbing lines. Thirty-two years old, temperate and a hustler. Well up on molding machines and mixing metals. Address 0-2, care THE METAL INDUSTRY.

SITUATION WANTED—Position as MANAGER or SUPERINTENDENT with concern manufacturing BRASS GOODS. Technical graduate, married, sober, industrious and energetic, 30 years old, experienced on PLUMBERS' BRASS GOODS, BUILDERS' HARDWARE, etc.; INTERCHANGEABLE PARTS, modern methods, executive, cost accountant. References. Address R., care THE METAL INDUSTRY.

SITUATION WANTED—By a BRASS WORKS MANAGER, in the Middle West preferred. Thoroughly understands the manufacture of BRASS and METAL GOODS and desires to connect with some manufacturing business, having capital to invest if the right business is secured. Address MANAGER, care THE METAL INDUSTRY.

PROFESSIONAL

SITUATION WANTED—By technical trained METALLURGIST, graduate of Eastern university; several years' practice in large galvanizing works. Would like to engage with galvanizing or sherardizing firm. Best of references. Address UNIVERSITY, care THE METAL INDUSTRY.

SITUATION WANTED—By a practical STEAM and ELECTRICAL ENGINEER, 2nd class N. Y. license; wishes steady employment. Holding a responsible position for the last 8 years with a large modern electrical plant. Good reference; capable of taking charge. Address T. S., care THE METAL INDUSTRY.

SITUATION WANTED—By METALLURGIST who has had 12 years' experience as CHEMIST, METALLURGIST and ASSISTANT SUPERINTENDENT. Desire change of work and advancement. Address C, care THE METAL INDUSTRY.

SITUATION WANTED—A METALLURGICAL CHEMIST of ten years' practical FOUNDRY and ANALYTICAL experience desires a position with a large manufacturing concern where such foundry and laboratory experience would be appreciated. Address HYDRAULIC BRONZE, care THE METAL INDUSTRY.

SITUATION WANTED—CHEMIST, 8 years with U. S. GOVERNMENT. Thoroughly experienced in the analysis of non-ferrous alloys, metallurgical products. Desire to make a change and would like to correspond with an established concern. Can furnish excellent references. Moderate salary. Address J. J. B., care THE METAL INDUSTRY.

SITUATION WANTED—As CHEMIST. A technical graduate with five years' practical experience in metallurgical laboratories. Can furnish references upon request. Address N-4, care THE METAL INDUSTRY.

SALESMAN

SITUATION WANTED—SALESMAN to represent manufacturer in Chicago and Middle West. Especially successful in selling specialties. Have well equipped office, acquaintanceship among hardware, stationery and department store buyers. Can furnish references. Address SAVAGE, 56 Fifth avenue, Chicago, Ill.

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SITUATIONS WANTED—Continued

PATTERN MAKER

SITUATION WANTED—By a MODELLER and PATTERN MAKER in the Brass trade. Have had 25 years' experience in gas, electric, water and steam fittings, cabinet, brass foundry and bedstead manufacture. For four successive years have held a position as teacher in classes arranged for BRASS WORKERS in all departments, for practical and theoretical instruction. For full particulars of my ability, etc., address F-10, care THE METAL INDUSTRY.

SITUATION WANTED—FOREMAN METAL PATTERN MAKER experienced on steam specialties and plumbers' brass goods, also the manufacture of general brass goods. Address B, care THE METAL INDUSTRY.

FOUNDERS

SITUATION WANTED—By FURNACE TENDER. Has had 9 years' experience and can furnish references. Address A-3, care THE METAL INDUSTRY.

SITUATION WANTED—By BRASS FOUNDRY FOREMAN on fine BRASS and BRONZE CASTINGS. Address, F. B. B., care THE METAL INDUSTRY.

SITUATION WANTED—BRASS and BRONZE WORKER with many years' experience on church work, railing, architectural work, German silver work, hard soldering and all details for the BRASS and BRONZE trade. For good wages and steady position I am willing to go to any part of the United States. Address 100, care THE METAL INDUSTRY.

SITUATION WANTED—By a BRASS MOLDER, 36 years old, experienced in jobbing and chandelier work. Able to take charge if required. Vicinity of New York preferred. Address P. P., care THE METAL INDUSTRY.

SITUATION WANTED—By a PLASTER COMPOSITION FOUNDRYMAN with 9 years' experience at fine arts castings in metals, plaster, wax and glue; also for patterns for engraving machines. Address P. C. F., care THE METAL INDUSTRY.

SITUATION WANTED—FRENCH SAND MOLDER wishes a position in foundry. Experienced on ornamental and architectural bronze, statuary, gold and silver castings. Estimates given on all kinds of work. Address FRENCH SAND MOLDER, care THE METAL INDUSTRY.

GERMAN SILVER CASTER

SITUATION WANTED—By GERMAN SILVER and BRASS INGOT CASTER. Have had 16 years' experience in high-grade German Silver and Brass. Can make my own German silver and silver solders. Address CASTER, care THE METAL INDUSTRY.

SHEET METAL WORKER

SITUATION WANTED—By FOREMAN SHEET METAL WORKER. Good all round man on brazing, silver soldering, hammering. Does own turning. Address F-1, care THE METAL INDUSTRY.

CHASER

SITUATION WANTED—By CHASER for ornamental and statuary work; 4 years' experience at Paris. Address F. C., care THE METAL INDUSTRY.

ETCHER

SITUATION WANTED—Thoroughly practical transfer etcher on silver, brass, copper and organic substances, desires to make a change. Good recommendations. Address X. T., care THE METAL INDUSTRY.

PLATERS AND POLISHERS

ELECTROPLATERS

Any one desiring the services of first class men for the electro-deposition of metals and finishing in all branches and departments of the plating business can secure such services by corresponding with the Secretary of the National Electro-Platers' Association, George B. Hogaboom, 656 Hunterdon Street, Newark, N. J.

SITUATION WANTED—FOREMAN PLATER or ASSISTANT. Thoroughly competent in the manipulating and handling of SILVER, NICKEL, COPPER, BRONZE, BRASS and immersion solutions. Thorough knowledge and conversant with all dips and colors known to the trade. Would like to connect with a manufacturer of plumbing supplies, job shop or manufacturing chandelier concern who desire the services of an experienced electro-depositor and finisher. Qualified and capable of taking entire charge of plant. Address CUTLERY, care THE METAL INDUSTRY.

SITUATIONS WANTED—Continued

PLATERS AND POLISHERS—Continued.

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Stevens, Frederic B., Detroit, Mich.

Core Tapering Machines (See also Foundry Supplies).
Brown Specialty M'ch'y Co., Chicago, Ill.
Detroit Foundry Supply Co., Detroit, Mich.
Nicholls, Wm. H., New York.
Pangborn, Thomas W., Company, New York.

Cranes.
Detroit Foundry Supply Co., Detroit, Mich.

Crucibles, Platinum
Bishop, J., & Co., Malvern, Pa.

Crucibles, Stirrers, Stoppers, Nozzles, Etc. (See also Foundry Supplies).
Bartley, Jonathan, Crucible Co., Trenton, N. J.
Dixon, Jos., Crucible Co., Jersey City, N. J.
Gautier, J. H. & Co., Jersey City, N. J.
McCullough-Dalzell Crucible Co., Pittsburg, Pa.
Paige Retort & Crucible Co., Taunton, Mass.
Ross-Tacony Crucible Co., Philadelphia, Pa.
Taylor, R. J., Inc., Philadelphia, Pa.

Crushers, Cinder (See also Foundry Supplies).
Detroit Foundry Supply Co., Detroit, Mich.
Farrel Foundry & Machine Co., Ansonia, Conn.
Moussette, O. J., Co., Brooklyn, N. Y.
Nicholls, Wm. H., New York.
Osborn Mfg. Co., Cleveland, O.
Waterbury (Conn.) Farrell Foundry & Machine Co.

Cuprer Metal.
Cuprer Co., The, New York.

Cyanide of Potassium (See also Platers' Supplies).
McKesson & Robbins, New York.

Die-Castings.
Finished Parts Mfg. Co., Newark, N. J.

Dies, Sheet Metal Working
Baird Machine Co., Oakville, Conn.
Bliss, E. W., Co., Brooklyn, N. Y.
Blue Ridge Metal Mfg. Co., Susquehanna, Pa.
Globe Machine Stamping Co., Cleveland, O.
Waterburry (Conn.) Farrel Foundry & Machine Co.

Draw Benches—Wire, Rod and Tube
Farrel Foundry & Machine Co., Ansonia, Conn.
Oliver, W. W. Mfg. Co., Buffalo, N. Y.
Torrington Mfg. Co., Torrington, Mass.
Waterbury (Conn.) Farrel Foundry & Machine Co.

Drying-Out Machines.
Baird Machine Co., Oakville, Conn.
Smith & Richardson, Attleboro, Mass.
Torrington Mfg. Co., Torrington, Mass.
Waterbury (Conn.) Farrel Foundry & Machine Co.

Drosses (See Metal Turnings, Drosses, etc.).

Dust Collectors.
Cleveland Blow Pipe & Mfg. Co., Cleveland, O.
Kirk & Blum, Cincinnati, O.
Knickerbocker Co., The, Jackson, Mich.
Leiman Bros., New York.
Pangborn, Thomas W., Company, New York.

Dynamos, Platers' and Galvanizers' (See also Platers' Supplies).
Backus & Lesser Co., New York.
Benjamin's, Inc., Philadelphia, Pa.
Bennett-O'Connell Co., Chicago, Ill.
Bogue, Chas. J., Electric Co., New York.
Connecticut Dynamo & Motor Co., Irvington, N. J.
Hanson & Van Winkle Co., Newark, N. J.
L'Hommedieu, C. L. & Sons, Chicago, Ill.
Oliver, W. W., Mfg. Co., Buffalo, N. Y.
U. S. Electro Galvanizing Co., Brooklyn, N. Y.

Electroplating, Polishing, Coloring, Etc.
American Toy & Novelty Co., Chicago, Ill.
Blue Ridge Metal Mfg. Co., Susquehanna, Pa.
Buermann, August, Newark, N. J.
Northern Ohio Mfg. & Refg. Works, Cleveland, O.
Sargeant Mfg. Co., Newark, N. J.

Emery. (See Platers' Supplies).

Emery Wheels, Flexible
American Oil & Supply Co., Newark, N. J.

Enameling Ovens.
Gehnrich, Herrmann, New York.
Rockwell Furnace Co., New York.
Steiner, E. E., Newark, N. J.

Engineers, Mechanical, Foundry, Etc.
Pangborn, Thomas W., Company, New York.
Smith, J. D., Foundry Supply Co., Cleveland, O.
Thompson, Hugh L., Waterbury, Conn.

Escutcheon Pins, All Metals
Hassall, John, New York.

Etched Name Plates.
Schweizer, Max, Bridgeport, Conn.

Exhaust Fans.
Cleveland Blow Pipe & Mfg. Co., Cleveland, O.
Leiman Bros., New York.
Pangborn, Thomas W., Company, New York.

Expert Instruction—Plating, Coloring, Dipping Etching, Etc.
Proctor & Stremel, Arlington, N. J.
Schweizer, Max, Bridgeport, Conn.

Felt Manufacturers.
Bacon Felt Co., Winchester, Mass.

Fire Brick (See also Foundry Supplies).
Detroit Foundry Supply Co., Detroit, Mich.
Stevens, Frederic B., Detroit, Mich.

Flasks, Brass Molders' (See also Foundry Supplies).
McPhee, Hugh, Tarrytown, N. Y.
Middleditch, Benj., Detroit, Mich.
Nicholls, W. H., New York.
Osborn Mfg. Co., Cleveland, O.

Fluxes, Metal (See also Foundry Supplies).
Bassite Smelting & Mfg. Co., Cincinnati, O.

Fluxes, Soldering and Tinning
Grasselli Chemical Co., Cleveland, O.
Reeves, Paul S., & Son, Philadelphia, Pa.
Richards & Co., Boston, Mass.
Spice, The Alfred, Process, Philadelphia, Pa.

Forgings, Automobile
American Manganese Bronze Co., New York.
Bliss, E. W., Co., Brooklyn, N. Y.

Foundry Facings (See also Foundry Supplies).
Detroit Foundry Supply Co., Detroit, Mich.
Dixon, Jos., Crucible Co., Jersey City, N. J.
McKesson & Robbins, New York.
Stevens, Frederic B., Detroit, Mich.

Foundry Supplies and Equipment.
Birkenstein S., & Sons, Chicago, Ill.
Brown Specialty Machinery Co., Chicago, Ill.
Detroit Foundry Supply Co., Detroit, Mich.
Fisher, Alfred, Chicago, Ill.
Hawley Down Draft Furnace Co., Chicago, Ill.
Kroschell Bros. Co., Chicago, Ill.
McPhee, Hugh, Tarrytown, N. Y.
Middleditch, Benj., Detroit, Mich.
Monarch Eng. & Mfg. Co., Baltimore, Md.
Nicholls, Wm. H., New York.
Obermayer Co., The S., Cincinnati, O.
Osborn Mfg. Co., Cleveland, O.
Pangborn, Thomas W., Company, New York.
Smith, J. D., Foundry Supply Co., Cleveland, O.
Stevens, Frederic B., Detroit, Mich.

Furnace Linings (See also Foundry Supplies).
Detroit Foundry Supply Co., Detroit, Mich.
Rockwell Furnace Co., New York.
Stevens, Frederic B., Detroit, Mich.

Furnaces, Annealing, Brazing, Etc.
Bates & Peard Annealing Furnace Co., New York.
Detroit Foundry Supply Co., Detroit, Mich.
Fisher, Alfred, Chicago, Ill.
Leiman Bros., New York.
Monarch Eng. & Mfg. Co., Baltimore, Md.
Rockwell Furnace Co., New York.
Rockwell, W. S., Co., New York.
Waterbury (Conn.) Farrel Foundry & Machine Co.

Furnaces, Electric
Bristol Co., The Waterbury, Conn.

Furnaces, Galvanizing and Tinning
Farrel Foundry & Machine Co., Ansonia, Conn.
Monarch Eng. & Mfg. Co., Baltimore, Md.
Rockwell Furnace Co., New York.
Rockwell, W. S., Co., New York.

Furnaces, Melting, for Oil, Coal, Coke, or Gas (See also Foundry Supplies).
Chicago Flexible Shaft Co., Chicago, Ill.
Detroit Foundry Supply Co., Detroit, Mich.
Fisher, Alfred, Chicago, Ill.
Hawley Down Draft Furnace Co., Chicago, Ill.
Ideal Furnace Co., Chester, Pa.
Kroschell Bros. Co., Chicago, Ill.
Leiman Bros., New York.
Monarch Eng. & Mfg. Co., Baltimore, Md.
Rockwell Furnace Co., New York.
Rockwell, W. S., Co., New York.
Wise, J. B., Watertown, N. Y.

Furnaces, Reverberatory
Rockwell Furnace Co., New York.
Rockwell, W. S., Co., New York.

Fusel Oil, Refined (See also Platers' Supplies).
McKesson & Robbins, New York.
Nikolas, G. J., & Co., Chicago, Ill.

Galvanized Specialties, Nails, Screws, Etc.
U. S. Electro Galvanizing Co., Brooklyn, N. Y.

Galvanizers' Equipment (See also Platers' and Polishers' Supplies).
Globe Machine & Stamping Co., Cleveland, O.
Hanson & Van Winkle Co., Newark, N. J.
Meaker Co., Chicago, Ill.
U. S. Electro Galvanizing Co., Brooklyn, N. Y.

Galvanizing Barrels and Automatic Devices.
U. S. Electro Galvanizing Co., Brooklyn, N. Y.
Globe Machine & Stamping Co., Cleveland, O.

Galvanizing for the Trade.
U. S. Electro Galvanizing Co., Brooklyn, N. Y.

Galvanizing Plants.
Globe Machine & Stamping Co., Cleveland, O.
Hanson & Van Winkle Co., Newark, N. J.
Meaker Co., Chicago, Ill.
U. S. Electro Galvanizing Co., Brooklyn, N. Y.

German Silver Ingots, Castings, Etc.
Buermann, August, Newark, N. J.
Reeves, Paul S., & Son, Philadelphia, Pa.
Riverside Metal Co., Riverside, N. J.
Seymour Manufacturing Co., The, Seymour, Conn.

German Silver Sheets, Wire, Rods, Tubes, Etc.
Pilling Bros. Co., Waterbury, Conn.
Reeves, Paul S., & Son, Philadelphia, Pa.
Riverside Metal Co., Riverside, N. J.
Scovill Manufacturing Co., Waterbury, Conn.
Seymour Manufacturing Co., The, Seymour, Conn.
Waterbury Brass Co., Waterbury, Conn.

Gold Alloys.
Riverside Metal Co., Riverside, N. J.

Gold, Chloride of (See also Platers' Supplies).
Ames, M., Glens Falls, N. Y.

Gold Ingots, Bars, Plates, Etc.
Renziehausen, Wm. F., Co., Newark, N. J.
Riverside Metal Co., Riverside, N. J.

Graphite (See Foundry Supplies).

Grinding Wheels (See also Foundry Supplies).
American Oil & Supply Co., Newark, N. J.

Grinding Machinery.
Bennett-O'Connell Co., Chicago, Ill.
Blake & Johnson Co., Waterbury, Conn.
Connecticut Dynamo & Motor Co., Irvington, N. J.
Osborn Mfg. Co., Cleveland, O.
Schulz, Fritz A., Chicago, Ill.
Waterbury (Conn.) Farrel Foundry & Machine Co.

Heat Gages.
Bristol Co., Waterbury, Conn.

Hoists, Electric, Pneumatic, Hand
Detroit Foundry Supply Co., Detroit, Mich.

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Waterbury (Conn.) Farrel Foundry & Machine Co.
Watson-Stillman Co., New York.

Iron, Scrap, Dealers in
Smith, The Morton B., New York.

Iron Tubes, Brass and Bronze Covered
Phoenix Tube Co., Brooklyn, N. Y.

Japanning Ovens.
Gehnrich, Hermann, New York.
Rockwell Furnace Co., New York.
Steiner, E. E., Newark, N. J.

Jewelers' Equipment and Supplies (See also Plater's Supplies).
American Oil & Supply Co., Newark, N. J.
Leiman Bros., New York.
Oliver, W. W., Mfg. Co., Buffalo, N. Y.

Jewelers' Findings.
Smith & Richardson, Attleboro, Mass.

Kettles, Galvanizing and Tinning (See also Platers' Supplies).
Farrel Foundry & Machine Co., Ansonia, Conn.

Lacquer Enamels (See also Platers' Supplies).
Celluloid Zapon Co., New York.
Egyptian Lacquer Mfg. Co., New York.
Eureka Pneumatic Spray Co., New York.

Lacquering Ovens.
Gehnrich, Hermann, New York.
Steiner, E. E., Newark, N. J.

Lacquer Sprayers.
Eclipse Air Brush & Compressor Co., Bloomfield, N. J.
Eureka Pneumatic Spray Co., New York.
Paasche Air Brush Co., Chicago, Ill.

Lacquers, Metal (See also Platers' Supplies).
American Lacquer Co., Bridgeport, Conn.
Celluloid Zapon Co., New York.
Egyptian Lacquer Manufacturing Co., New York.
Eureka Pneumatic Spray Co., New York.
General Bakelite Co., New York.
Hanson & Van Winkle Co., Newark, N. J.
Kalbfleisch, Franklin H., Co., New York.
New Era Lustre Co., New Haven, Conn.
Nikolas, G. J., & Co., Chicago, Ill.

Ladle Heaters and Dryers (See also Foundry Supplies).
Detroit Foundry Supply Co., Detroit, Mich.
Hawley Down Draft Furnace Co., Chicago, Ill.
Monarch Eng. & Mfg. Co., Baltimore, Md.
Pangborn, Thomas W., Co., Baltimore, Md.
Rockwell Furnace Co., New York.

Ladles (See also Foundry Supplies).
Detroit Foundry Supply Co., Detroit, Mich.

Lathes, Polishing (See Platers' and Polishers' Supplies).

Lathes, Spinning, Turning, Etc.
American Tool & Machine Co., Boston, Mass.
Bliss, E. W., Co., Brooklyn, N. Y.
Oliver, W. W., Mfg. Co., Buffalo, N. Y.
Pryibil, P., New York.
Schulz, Fritz A., Chicago, Ill.
Waterbury (Conn.) Farrel Foundry & Machine Co.

Lathes, Turret
American Tool & Machine Co., Boston, Mass.

Lead, Antimonial
Leavitt, C. W., & Co., New York.
Richards & Co., Boston, Mass.
Standard Rolling Mills Inc., Brooklyn, N. Y.

Lead Castings, Antimonial
Standard Rolling Mills Inc., Brooklyn, N. Y.

Lead, Pig and Bar
American Smelting & Refining Co., Cincinnati, O.
Birkenstein, S., & Sons, Chicago, Ill.
Fitz, Dana & Co., Boston, Mass.
Hendricks Bros., New York.
Illinois Smelting & Refining Co., Chicago, Ill.
Merchant & Evans Co., Philadelphia, Pa.
National Metal Reduction Co., Cleveland, O.
Richards & Co., Boston, Mass.
Standard Rolling Mills Inc., Brooklyn, N. Y.
U. S. Reduction Co., Chicago, Ill.
Vogelstein, L., & Co., New York.

Lead Pipe.
North American Smelting Co., Philadelphia, Pa.

Lubricants.
Dixon, Joseph, Crucible Co., Jersey City, N. J.

Lycopodium. (See also Foundry Supplies).
McKesson & Robbins, New York.

Mahogany Pattern Lumber.
Thompson & Co., Lewis, Philadelphia, Pa.

Manganese Bronze Ingots and Castings.
Ajax Metal Co., Philadelphia, Pa.
Allan, A., & Son, New York.
American Manganese Bronze Co., New York.
Clum & Atkinson, Rochester, N. Y.
Electric Smelting & Alum. Co., Lockport, N. Y.
Fitz, Dana & Co., Boston, Mass.
North American Smelting Co., Philadelphia, Pa.
Reeves, Paul S., & Son, Philadelphia, Pa.
Richards & Co., Boston, Mass.
Riverside Metal Co., Riverside, N. J.
Taunton-New B'fd Copper Co., New Bedford, Mass.

Manganese Bronze Sheets, Rods, Etc.
American Manganese Bronze Co., New York.
Taunton-New B'fd Copper Co., New Bedford, Mass.

Manganese Copper.
American Metal Co., New York.
American Smelting & Refining Co., Cincinnati, O.
Electric Smelting & Alum. Co., Lockport, N. Y.
Reeves, Paul S., & Son, Philadelphia, Pa.
Riverside Metal Co., Riverside, N. J.
Roessler & Hasslacher Chemical Co., New York.

Manganese Metal.
Leavitt, C. W., & Co., New York.
Reeves, Paul S., & Son, Philadelphia, Pa.
Roessler & Hasslacher Chemical Co., New York.

Manganese Silicon.
Leavitt, C. W., & Co., New York.
McKesson & Robbins, New York.

Magnesium Aluminum.
Leavitt, C. W., & Co., New York.

Magnesium Metal.
Leavitt, C. W., & Co., New York.
McKesson & Robbins, New York.
Roessler & Hasslacher Chemical Co., New York.

Magnetic Metal Separators (See also Foundry Supplies).
American Concentrator Co., Joplin, Mo.
Capitol Brass Works, Detroit, Mich.
Dings Electro-Mag. Separator Co., Milwaukee, Wis.
Pangborn, Thomas W., Company, New York.

Match Plates.
McPhee, Hugh, Tarrytown, N. Y.
Middleditch, Benj., Detroit, Mich.

Metals (See name of metal wanted).

Metal Cleaning Compounds (See also Platers' Supplies).
Anthony, H. M., & Co., New York.
Electric Smelt. & Aluminum Co., Lockport, N. Y.
Hanson & Van Winkle Co., Newark, N. J.
International Chemical Co., Camden, N. J.
Stevens, Frederic B., Detroit, Mich.
Swan & Finch Co., New York.

Metal Fluxes (See also Foundry Supplies).
Bassite Smelting & Mfg. Co., Cincinnati, O.
Reeves, Paul S., & Son, Philadelphia, Pa.

Metallurgists, Consulting,
Detroit Testing Laboratory, Detroit, Mich.
Krom, L. J., New York.
Ledoux & Co., New York.

Metals, Dealers in all Kinds of New (See also name of metal wanted).
Andler, M. M., & Co., Boston, Mass.
Birkenstein, S., & Sons, Chicago, Ill.
Fitz, Dana & Co., Boston, Mass.
Merchant & Evans Co., Philadelphia, Pa.
Moers, Albert A., New York.
Richards & Co., Boston, Mass.

Metals, Dealers in Old
Andler, M. M., & Co., Boston, Mass.
Birkenstein, S., & Sons, Chicago, Ill.
Genesee Metal Co., Rochester, N. Y.
Illinois Smelting & Refining Co., Chicago, Ill.
Smith, The Morton B., Co., New York.
Riverside Metal Co., Riverside, N. J.

Metals, Dealers in Old—Gold, Silver, Platinum
Renziehausen, Wm. F., Co., Newark, N. J.
Riverside Metal Co., Riverside, N. J.

Metal Goods Made to Order.
Aluminum Goods Mfg. Co., Manitowoc, Wis.
American Toy & Novelty Co., Chicago, Ill.
Ansonia Brass & Copper Co., New York.
Blue Ridge Metal Mfg. Co., Susquehanna, Pa.
Bridgeport Brass Co., Bridgeport, Conn.
Buermann, August, Newark, N. J.
Manhattan Brass Co., New York.
Riverside Metal Co., Riverside, N. J.
Sargeant Mfg. Co., Newark, N. J.
Scovill Manufacturing Co., Waterbury, Conn.
Waterbury Brass Co., Waterbury, Conn.

Metal, Plated Sheet
Benson, H. K. & F. S., Glen Ridge, N. J.
National Sheet Metal Co., Peru, Ill.

Metal Refiners, Gold and Silver.
Genesee Metal Co., Rochester, N. Y.
Renziehausen, Wm. F., Co., Newark, N. J.
Riverside Metal Co., Riverside, N. J.

Metal Refiners—White Metal.
Birkenstein, S., & Sons, Chicago, Ill.
National Metal Reduction Co., Cleveland, O.
Reeves, Paul S., & Sons, Philadelphia, Pa.
Standard Rolling Mills Inc., Brooklyn, N. Y.
Toothill, John, Rochelle Park, N. J.

Metal, Silver Plated Sheet
Benson, H. K. & F. S., Glen Ridge, N. J.

Metal Spinning. (See also Metal Goods made to order).
Aluminum Goods Mfg. Co., Manitowoc, Wis.
Blue Ridge Metal Mfg. Co., Susquehanna, Pa.
Detroit Metal Spinning Co., Detroit, Mich.
Riverside Metal Co., Riverside, N. J.
Standard Rolling Mills Inc., Brooklyn, N. Y.

Metal Stamping. (See also Metal Goods made to order).
Aluminum Goods Mfg. Co., Manitowoc, Wis.
Blue Ridge Metal Mfg. Co., Susquehanna, Pa.
Detroit Metal Spinning Co., Detroit, Mich.
Globe Machine & Stamping Co., Cleveland, O.
Riverside Metal Co., Riverside, N. J.
Standard Rolling Mills Inc., Brooklyn, N. Y.

Metal Turnings, Drosses, Residue, Etc., Buyers of
Andler, M. M., Co., Boston, Mass.
Birkenstein, S., & Sons, Chicago, Ill.
Illinois Smelting & Refining Co., Chicago, Ill.
Smith, The Morton B., Co., New York.
Toothill, John, Rochelle Park, N. J.
Whipple & Choate, Bridgeport, Conn.
White & Bro., Inc., Philadelphia, Pa.

Mold Dryers, Portable (See also Foundry Supplies).
Detroit Foundry Supply Co., Detroit, Mich.
Monarch Eng. & Mfg. Co., Baltimore, Md.
Pangborn, Thomas W., Company, New York.
Rockwell Furnace Co., New York.

Mold Spraying Machines. (See also Foundry Supplies).
Pangborn, Thomas W., Company, New York.

Molds, Ingot (See also Foundry Supplies).
Farrel Foundry & Machine Co., Ansonia, Conn.
Leiman Bros., New York.
Nicholls, Wm. H., New York.
Waterbury (Conn.) Farrel Foundry & Machine Co.

Molding Machines. (See also Foundry Supplies).
Detroit Foundry Supply Co., Detroit, Mich.
McPhee, Hugh, Tarrytown, N. Y.
Nicholls, Wm. H., New York.
Osborn Mfg. Co., Cleveland, O.
Turner Machine Co., Philadelphia, Pa.

Monel Metal Sheets.
Merchant & Evans Co., Philadelphia, Pa.

Muntz's Metal—Sheets, Rods, Bolts, Nails, Etc.
Taunton-New B'fd Copper Co., New Bedford, Mass.

Nails. (See name of metal wanted).

Name Plates, Etched
Schweizer, Max, Bridgeport, Conn.

Nickel.
Hanson & Van Winkle Co., Newark, N. J.
Hendricks Bros., New York.
Leavitt, C. W., & Co., New York.
Merchant & Evans Co., Philadelphia, Pa.
Richards & Co., Boston, Mass.

Nickel Castings.
Hanson & Van Winkle Co., Newark, N. J.

Nickel Salts. (See also Platers' Supplies).
Detroit Foundry Supply Co., Detroit, Mich.
Hanson & Van Winkle Co., Newark, N. J.
McKesson & Robbins, New York.

Nickel, Shot
Merchant & Evans Co., Philadelphia, Pa.
Seymour Manufacturing Co., Seymour, Conn.

Nickel Silver Tubes.
Wells, A. H., & Co., Waterbury, Conn.

Oil Pumps and Storage Tanks.
Monarch Eng. & Mfg. Co., Baltimore, Md.
Rockwell Furnace Co., New York.

Oils, Tempering and Lubricating
McKesson & Robbins, New York.
Swan & Finch, New York.

Ovens. (See also Core, Lacquering, Enameling and Sherardizing Ovens).
Gehnrich, Hermann, New York.
Steiner, E. E., Newark, N. J.

Paint for Metals, Etc.
Woolsey, C. A., Co., Jersey City, N. J.

Parting Compounds. (See also Foundry Supplies).
Detroit Foundry Supply Co., Detroit, Mich.
Stevens, Frederic B., Detroit, Mich.

Pattern Lumber, Mahogany
Thompson & Co., Lewis, Philadelphia, Pa.

Pattern Shop Supplies (See Foundry Supplies).

Patterns, Mounted
McPhee, Hugh, Tarrytown, N. Y.

Pewter.
Standard Rolling Mills Inc., Brooklyn, N. Y.

Phosphor Bronze Ingots, Castings, Etc.
Ajax Metal Co., Philadelphia, Pa.
Allan, A., & Son, New York.
Clum & Atkinson, Rochester, N. Y.
Fitz, Dana & Co., Boston, Mass.
Illinois Smelting & Refining Co., Chicago, Ill.
Phosphor Bronze Smelting Co., Philadelphia, Pa.
Reeves, Paul S., & Son, Philadelphia, Pa.
Riverside Metal Co., Riverside, N. J.
Seymour Mfg. Co., Seymour, Conn.

Phosphor Bronze Sheets, Wire, Rods, Etc.
Phosphor Bronze Smelting Co., Philadelphia, Pa.
Pilling Brass Co., Waterbury, Conn.
Reeves, Paul S., & Son, Philadelphia, Pa.
Riverside Metal Co., Riverside, N. J.
Seymour Mfg. Co., Seymour, Conn.

Phosphor Copper.
American Smelting & Refining Co., Cincinnati, O.
Electric Smelt. & Aluminum Co., Lockport, N. Y.
North American Smelting Co., Philadelphia, Pa.
Reeves, Paul S., & Son, Philadelphia, Pa.
Richards & Co., Boston, Mass.
Riverside Metal Co., Riverside, N. J.
Roessler & Hasslacher Chemical Co., New York.

Phosphor Tin.
American Smelting & Refining Co., Cincinnati, O.
Electric Smelt. & Aluminum Co., Lockport, N. Y.
Clum & Atkinson, Rochester, N. Y.
North American Smelting Co., Philadelphia, Pa.
Reeves, Paul S., & Son, Philadelphia, Pa.
Richards & Co., Boston, Mass.

Phosphorus. (See also Foundry Supplies).
General Chemical Co., Philadelphia, Pa.
McKesson & Robbins, New York.

Pickling Machines, Automatic
Bliss, E. W., Co., Brooklyn, N. Y.
Schmitz, August, Dusseldorf, Germany.
Torrington Manufacturing Co., Torrington, Conn.

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International Chemical Co., Camden, N. J.
Swan & Finch Co., New York.

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Abbott Ball Co., Hartford, Conn.
American Oil & Supply Co., Newark, N. J.
Ames, M., Glens Falls, N. Y.
Anthony, H. M., Co., New York.
Automatic Buffing Machine Co., Buffalo, N. Y.
Backus & Leeser Co., New York.
Bacon Felt Co., Winchester, Mass.
Baird Machine Co., Oakville, Conn.
Bennett-O'Connell Co., Chicago, Ill.
Burns, E. Reed, Brooklyn, N. Y.
Canning, W., & Co., Birmingham, England.
Connecticut Dynamo & Motor Co., Irvington, N. J.
Detroit Foundry Supply Co., Detroit, Mich.
Divine Bros. Co., Utica, N. Y.
General Bakelite Co., New York.
Globe Machine & Stamping Co., Cleveland, O.
Grasselli Chemical Co., Cleveland, O.
Hanson & Van Winkle Co., Newark, N. J.
International Chemical Co., Camden, N. J.
Klauder-Weldon Dy'g Mach. Co., Amsterdam, N. Y.
Leiman Bros., New York.
L'Hommedieu, C. F., & Sons, Chicago, Ill.
Meaker Company, Chicago, Ill.
McKesson & Robbins, New York.
Roessler & Hasslacher Chemical Co., New York.
Rockhill & Vietor, New York.
Roth Bros. Co., Chicago, Ill.
Smith & Richardson, Attleboro, Mass.
Stevens, Frederic B., Detroit, Mich.
Swan & Finch Co., New York.
U. S. Electro Galvanizing Co., Brooklyn, N. Y.

Plating Barrels and Apparatus.
(See also Platers' Supplies).
Abbott Ball Co., Hartford, Conn.
Backus & Leeser Co., New York.
Baird Machine Co., Oakville, Conn.
Bennett-O'Connell Co., Chicago, Ill.
Connecticut Dynamo & Motor Co., Irvington, N. J.
Globe Machine & Stamping Co., Cleveland, O.
Hanson & Van Winkle Co., Newark, N. J.
L'Hommedieu, C. F., & Sons Co., Chicago, Ill.
Klauder-Weldon Dye'g Mach. Co., Amsterdam, N.Y.
Rockhill & Vietor, New York.
Smith & Richardson, Attleboro, Mass.
U. S. Electro Galvanizing Co., Brooklyn, N. Y.

Platinum Alloys, Salts, Solutions.
Bishop, J., & Co., Malvern, Pa.

Platinum Ingots.
Guiterman, Rosenfeld & Co., New York.

Platinum Laboratory Ware.
Bishop, J., & Co., Malvern, Pa.

Platinum Manufactured Goods.
Bishop, J., & Co., Malvern, Pa.

Platinum Refiners.
Bishop, J., & Co., Malvern, Pa.

Platinum Scrap, Buyers of
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Presses, Drop
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Blake & Johnson Co., Waterbury, Conn.
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Jackson, John J., Co., Newark, N. J.
Renziehausen, Wm. F., Co., Newark, N. J.
Riverside Metal Co., Riverside, N. J.

Silver Wire.
Jackson, John J., Co., Newark, N. J.

Smelters, Sweep
Renziehausen, Wm. F., Co., Newark, N. J.

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International Chemical Co., Camden, N. J.

Solder, Aluminum
Aluminum Company of America, Pittsburg, Pa.
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Clum & Atkinson, Rochester, N. Y.
Electric Smelt. & Aluminum Co., Lockport, N. Y.
Janney, Steinmetz & Co., Philadelphia, Pa.
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Richards & Co., Boston, Mass.
U. S. Reduction Co., Chicago, Ill.

Solder, Brazing
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Hussey, C. G., & Co., Pittsburg, Pa.
Linton & Co., Providence, R. I.
Merchant & Evans Co., Philadelphia, Pa.
National Metal Reduction Co., Cleveland, O.
Naulty Smelting & Ref'g Co., Philadelphia, Pa.
North American Smelting Co., Philadelphia, Pa.
Richards & Co., Boston, Mass.
Shimer, H. M., & Co., Philadelphia, Pa.

Solder, Gold
Linton & Co., Providence, R. I.

Solder, Silver
Jackson, John J., & Co., Newark, N. J.
Linton & Co., Providence, R. I.

Solder, Tinners'
American Smelting & Refining Co., Cincinnati, O.
Merchant & Evans Co., Philadelphia, Pa.
National Metal Reduction Co., Cleveland, O.
North American Smelting Co., Philadelphia, Pa.
Richards & Co., Boston, Mass.

Spelter.
American Smelting & Refining Co., Cincinnati, O.
Birkenstein, S., & Sons, Chicago, Ill.
Fitz, Dana & Co., Boston, Mass.
Grasselli Chemical Co., Cleveland, O.
Hegeler Bros., Danville, Ill.
Hendricks Bros., New York.
Illinois Smelting & Refining Co., Chicago, Ill.
Illinois Zinc Co., Peru, Ill.
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Mathiesen & Hegeler Zinc Co., La Salle, Ill.
National Metal Reduction Co., Cleveland, O.
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Richards & Co., Boston, Mass.
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Pryibil, P., New York.
Schulz, Fritz A., Chicago, Ill.

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Eclipse Air Brush & Compressor Co., Bloomfield, N. J.
Eureka Pneumatic Spray Co., New York.
Paasche Air Brush Co., Chicago, Ill.
Pangborn, Thomas W., Company, New York.

Sprue Cutters. (See also Foundry Supplies).
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Nicholls, Wm. H., New York.
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Smith, J. D., Foundry Supply Co., Cleveland, O.
Turner Machine Co., Philadelphia, Pa.
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Tanks, Electroplaters' (See also Platers' Supplies).
Chadwick-Boston Lead Co., Boston, Mass.
Corcoran, A. J., Inc., New York.
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Stearns, The A. T., Lumber Co., Boston, Mass.

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Leavitt, C. W., & Co., New York.
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Richards & Co., Boston, Mass.
Standard Rolling Mills Inc., Brooklyn, N. Y.
U. S. Reduction Co., Chicago, Ill.
Vogelstein, L., & Co., New York.

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Detroit Foundry Supply Co., Detroit, Mich.
McKesson & Robbins, New York.

Trolley Systems.
Nicholls, Wm. H., New York.

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Globe Machine & Stamping Co., Cleveland, O.
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Pangborn, Thomas W., Company, New York.
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Leiman Bros., New York.

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Baird Machine Co., Oakville, Conn.
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Blake & Johnson Co., Waterbury, Conn.
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(PREMIER METAL HOUSE IN AMERICA)

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FOR INDEX TO ADVERTISEMENTS SEE PAGE 55

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High or Low Pressure Sprayers

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If you will note the number of manufacturers using Lacquers, you will realize that Egyptian Lacquers are by far the most popular Lacquers of the day.

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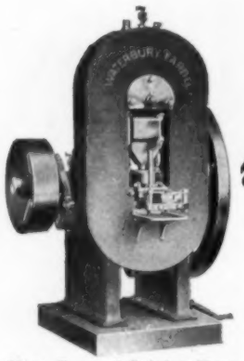


Mint Type of Coining Press

KNUCKLE JOINT PRESSES

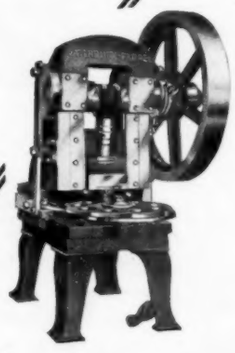
The illustration shows a type used in the United States Mint Service for Stamping coins. Many other patterns equally well adapted for special purposes.

Single Acting Open Back Presses

FOR GENERAL USE

The illustration shows a ratchet dial feed on a heavy open back press, for truing up and sizing, inside and outside, some large malleable iron bushings.

Let us know your particular press needs



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WATERBURY, CONN.

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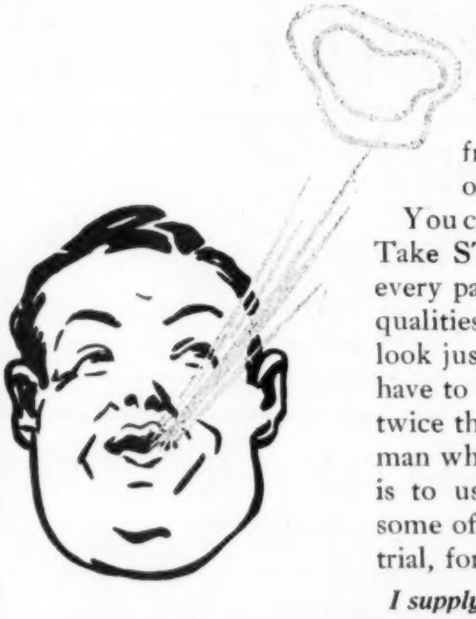

RINGS

When a ring comes from the "shop" to the office, it is frequently the ring of complaint: it ought to be the ring of content.

You can reverse that order by using my Buffing Compositions. Take **STEVEN'S TRIPOLI COMPOSITION** for illustration—every particle a cutting article. You buy it for its "cutting" qualities. A cake of some other kind with half its service would look just as well, but the half-work done with that kind would have to be made up with the use of coloring compositions at twice the cost. The ring of discontent would come from the man who pays the bill. The right way to avoid such a disaster is to use my compositions and I manufacture the entire line, some of them for specific purposes. You may have samples for trial, for proof without cost.

I supply, and install when desired, all kinds of Electrical Equipment.

I manufacture Foundry Facings, Foundry Supplies and Buffing Compositions and Platers' Supplies.

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